CIGRE Paris Session 2026

Provisional Technical Programme

See the list of Session Papers based on accepted synopses.

Kindly note that Session Papers selection is still under process. Therefore, the list may evolve. Final selection results will be on 11th May 2026.

A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION

A1 PS1 - Rotating electrical machines and the energy transition

ID: 10139
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating electrical machines and the energy transition
Keywords: Rotating electrical machine, turbogenerator, grid stability, kinetic inertia, Rate Of Change Of Frequency (RoCoF), Renewable Energy Integration, frequency variation, energy transition

Contribution of Large Synchronous Turbogenerators to RoCoF Mitigation in Low-Inertia Grids

H. BIELLMANN[1], E. BRONNER[2], V. DUBS[3], V. FERNAGUT[3], B. GUIDOUX[3], E. MONNOT[3]
[1]Arabelle Solutions; [2]GE vernova; [3]EDF

ID: 10141
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating electrical machines and the energy transition
Keywords: Inertia, Grid service, Grid stability, Frequency

Contributions to Stability through System Inertia: a fair reconciliation mechanism for the European electrical systeml o

J. HIS, T. VINAS
EDF

ID: 10194
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating electrical machines and the energy transition
Keywords: Synchronous, Compensators, STATCOM, HVDC

Synchronous Condenser Integration: A Green Grid Stabilisation Model for India's 500 GW Renewable Energy Vision

R. KUMAR*, K. K. GUPTA, V. BAGADIA, K K SARKAR
CTUIL

ID: 10200
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating electrical machines and the energy transition
Keywords: CHEMICAL, CLEANING, IMPACT ON STATOR, WINDING

Comprehensive analysis of chemical cleaning impact on stator winding hollow conductors and generator cooling water system performance

A. PANDEY*, K NAGESH, N. KHANDELWAL
NTPC Ltd

ID: 10792
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating electrical machines and the energy transition
Keywords: Hydropower modernization, digital systems, failure analysis, asset management

Performance Analysis of Electronic Components and Digital Systems in Modernized Hydroelectric Power Plants

R. T. SINISCALCHI[1], E. C. BORTONI[2], L. J. L. MENDES[1], C. C. VIEIRA[1], R. A. SOUZA[1]
[1]Eletrobras SA Brazil; [2]Itajubá University Brazil

ID: 10802
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating electrical machines and the energy transition
Keywords: Turn-to-turn insulation, transient voltage, field winding, analytical calculation

Analytical Determination of the Maximum Induced Turn Voltage in the Field Winding of Hydro-Generators During Stator Faults – The Turn-to-Turn Test Voltage

T. HILDINGER
Voith Hydro Brazil

ID: 10819
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating electrical machines and the energy transition

Enhanced Static Excitation System architecture for high-capacity Turbogenerators with improved current sharing and harmonic performance

K. SUBIR*, C. PARAG
NTPC Limited, India

ID: 10820
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating electrical machines and the energy transition
Keywords: Pumped Storage Plant, Inverter Based Resources, Low/High Voltage Ride Through, Point of Interconnection, Master Power Plant Controller, Electromagnetic Transient, Critical Clearing Time, Static VAR Generator

Recommendations for Technical Standards for Synchronous Machines Coloacted with Inverter Based Resources

H. HIMANSHI*, J. SHARMA, A. K. MEENA, D. N. ROZEKAR
Central Transmission Utility of India Limited, India

ID: 11244
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating electrical machines and the energy transition
Keywords: turbogenerator, harmonization of standards, technical requirements

A Modern Russian Standard for Turbogenerators

E. KADI-OGLY*[1], N. KOROVKIN[2], A. LASHUKOV[1], V. KUZ'MICHEV[3], M. ROYTGARTS*[4], N. GRISHIN[4], R. CHESTYUNIN[5], A. GRIGOR'EV[6], Y. SERGIEVSKIY[7], N. SIZOV[8], P. SOKUR[9], Y. SMETANYUK[10]
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ID: 11339
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating electrical machines and the energy transition
Keywords: Evaluation, Generator, Condenser Assets

Life Evaluation of Strategic Generator and Condenser Assets

R. SCOLLAY, V. BHANDARI
Machinemonitor, Australia

ID: 11447
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating electrical machines and the energy transition
Keywords: Thermal power generation; Condenser; Retrofit; Flexible operation

Development and Application of Adding Synchronous Condenser Function to Turbo Generator

F. CHEN, X. XIE, K. CAI, Z. XIAN, C. LIU
Shanghai Electric Power Generation Equipment Co., Ltd. Generator Plant

ID: 11449
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating electrical machines and the energy transition
Keywords: Hydro-generators; 1, 000 MW unit; High-voltage insulation; Air-cooled; Dynamic stability; Thrust bearing

Development and Engineering Application of Key Technologies for Baihetan 1000 MW Fully Air-Cooled Hydro-Generators

G. LI, G. QIN, B. ZHOU, Q. ZHANG, Z. WU, B. LAN
Harbin Electric Machinery Co., Ltd.

ID: 11451
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating electrical machines and the energy transition
Keywords: Air-cooled generator; Boron nitride(BN); High thermal conductivity(HTC); Heat conduction model; Fluorescence optical fiber temperature measurement (FOFTM)

Development of a High Thermal Conductivity Air-Cooled Generator Fabricated by GVPI technology

S. YU, Y. ZHANG, G. ZHENG, Y. WEI, B. YANG
Shanghai Electric Power Generation Equipment Co., Ltd. Generator Plant

ID: 11452
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating electrical machines and the energy transition
Keywords: Coordinated frequency-voltage support, flywheel energy storage condenser, brushless doubly-fed motor, power decoupling control, operating mode regulation

Research on the Application of High-Inertia Flywheel Energy Storage Condenser in High-Proportion Renewable Energy Power Systems

Y. LYU[1], Y. GAO[1], Z. LI[2], X. ZHA[1]
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ID: 11790
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating electrical machines and the energy transition
Keywords: predictive monitoring, early fault detection, machine learning, hydropower plant

Advanced Machine Learning-Based System for Predictive Monitoring and Early Fault Detection in Dubrovnik Hydropower Plant

H. FOROOZAN[1], O. OREŠKOVIC[1], B. FILIPOVIĆ-GRČIĆ[2], O. HUSNJAK[1], I. KRNIĆ[3], I. KOLIĆ[3], N. MIJALIĆ[3]
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ID: 11802
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating electrical machines and the energy transition
Keywords: Grid code, FRT, Two axis dynamic model, CCT, CCA, Inertia, Ceiling factor, Braking resistor, Fast valving

Parameter-driven strategies to analyze fault ride through capability of synchronous generator

P. BARUA
University West / Chalmers University of Technology

ID: 11889
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating electrical machines and the energy transition
Keywords: Energy Transition; Rotating Electrical Machines; Flexible Operation; Cycling; Induced Degradation; Combined Cycle Gas Turbine; Insulation Degradation; Operational Duty Shift; Reliability Analysis; Condition-Based Maintenance.

Impacts of the Energy Transition on the Reliability and Operational Flexibility of Rotating Electrical Machines: A Case Study of the Operational Cycling and Reliability from the Samra Combined Cycle Power Plant, Jordan

Y. MASHAGBEH
SEPCO-Samra Electric Power Generating Co

ID: 11952
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS1 - Rotating electrical machines and the energy transition

Underexcited saturation state in cylindrical rotor synchronous machines

M. EVENKAMP[1], S. GERTZ[2], H. STEINS[3]
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A1 PS2 - New machine developments

ID: 10142
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - New machine developments
Keywords: Turbo generator, hydrogen-cooling, water-cooling, four-pole generator, design, development, nuclear, factory test

Type test of the largest commercial 4-pole generator and exciter for a EPR power plant

B. WAHDAME[1], D. DE-ROZARIO[1], V. FERNAGUT[2], S. FERRIS[2]
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ID: 10180
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - New machine developments
Keywords: Circulating Currents - Harmonics - Nacelle - Reliability - Supra-Harmonics - Inter-Harmonics - Wind Turbines - DFIG

A Relative Harm Index Framework for Quantifying and Mitigating Circulating Currents, Harmonics and Supra-Harmonics in Wind Turbine Drive-Train Reliability

H. W. PENROSE
MotorDoc LLC, United States of America

ID: 10185
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - New machine developments
Keywords: High-Voltage Rotating Machine (HVRM) - Partial Discharge (PD) - Outer Faraday Shield - Bleaching - Carbon Black - Conductive Coating - Epoxy Resin - Generator Maintenance - Insulation Degradation - Ripple Springs - Slot Coating - Stator Winding

Slot Conductive Coatings for Electrical Contact Control in High-Voltage Generator Stator Windings

A. KHAZANOV, A. GEGENAVA, A. NIKOLAEV
National Electric Coil, United States of America

ID: 10196
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - New machine developments

Synchronous Condensers for India's Evolving Grid: Leveraging India's Retiring Generators for Reactive Power and Inertia Support

V. V YOM*, H. KUSHWAHA, R. SINGH
BHEL

ID: 10218
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - New machine developments
Keywords: Thermal Cycling - Stator Winding - Form-Wound Bars - Insulation System - IEEE 1310 - IEC 60034-18-34 - Digital Twin - Finite Element Analysis - Delamination - Acceptance Criteria - Field Correlation

Thermal Cycling of High-Voltage Generator Stator Windings: A Comparative Study of IEEE 1310 and IEC 60034-18-34 Using Simulation and Testing Experience

A. NIKOLAEV, A. KHAZANOV, A. GEGENAVA
National Electric Coil, United States of America

ID: 10219
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - New machine developments
Keywords: Accelerated Aging - Gradient Coating - Corona Discharge - Silicon Carbide (SiC) - Field Control - High Voltage Rotating Machine (HVRM) - Insulation Degradation - Partial Discharge (PD) - Outer Conductive Coating - Stator Winding - Stress Grading

The Gradient Coating Systems for Electrical Field Control in High-Voltage Generator Stator Windings

A. KHAZANOV, A. GEGENAVA, A. NIKOLAEV
National Electric Coil, United States of America

ID: 10782
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - New machine developments
Keywords: Insulation systems, stator windings, specification guidelines, reliability

Insulation Systems for Motors, Generators and Synchronous Condensers – Contributions to Writing Stator Winding Design Specifications

F. R. SPEZIA, C. S. GONÇALVES, J. A. DORIGON
WEG Brazil

ID: 10988
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - New machine developments
Keywords: Synchronous condenser, oil system failure, lube oil, jacking oil, AC pumps, DC pumps, emergency system, control system, inspection, flywheel, rotor, stator, bearings

"Severe damage to synchronous condensers, caused by lube failure, demand stricter requirements for the oil system"

A. DEL GRACCO
TERNA, Italy

ID: 11253
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - New machine developments
Keywords: Akkuyu NPP, turbogenerator's brushless excier, factory tests

Features of Akkuyu NPP Turbogenerator's Brushless Exciter and Factory Test Results

E. KADI-OGLY[1], D. DE-ROZARIO[2], B. WAHDAME[2], P. MEYER[2], A. CHEREPANOV[1], A. ALEKSANDROV[1], A. REZNICHENKO[1]
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ID: 11351
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - New machine developments
Keywords: Hydro generator, Variable speed, Full-power converter, Grid code compliance, Model identification

Model Validation of Full-power Converter Variable Speed Hydro Generators

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ID: 11551
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - New machine developments
Keywords: salient pole synchronous machines, vibration, magnetic balancing, rotor current control, unbalanced magnetic pull

Lessons learnt from actively balancing two units magnetically with rotor segmentation and dedicated power supplies which results in resolving vibration issues

U. LUNDIN
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ID: 11953
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - New machine developments
Keywords: Hydro-Generators; Motor-Generators; Pumped Storage; High-Speed: High-Output

Development and design of a 390 MVA / 600 rpm air-cooled motor-generator

T. HILDINGER[1], G. KLAUS[2], B. DIEBEL[3], D. EMMRICH[4], G. MORONIS[5], M. ADAM[6], M. GIESE[7], S. ALLGEYER[8]
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ID: 11954
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - New machine developments

Comparison of HV-Insulation system acc. IEC 60034-18-42 for a hydro-generator with different inverter technologies

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ID: 12595
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - New machine developments
Keywords: Hydro generators, integrated damper winding, pole-to-pole impedance, saturation effects, subtransient reactances

The integrated damper winding behaves like a continuous classic damper winding during sudden short circuits in large, saturated hydro generators

M. SVANBERG*[1], A. RIDDER[2], D. EMMRICH[3], E. BRESEMANN[2]
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ID: 12615
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - New machine developments
Keywords: Capability curves, magnetic saturation, reactive power limits, synchronous generators, voltage control

Saturation effects on synchronous generator reactive power limits: comparison of constant reactances and precise methods

F. GEGÚNDEZ[1], L. ROUCO[2], I. EGIDO[3], E. LOBATO[4], Á. BENÍTEZ DOMÍNGUEZ[5]
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ID: 12630
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS2 - New machine developments
Keywords: Hydrogenerator, Cooling method, Operation and maintenance

An Analysis of Long-Term Operation and Maintenance Characteristics of Air-Cooled and Evaporative-Cooled Hydrogenerators at Lijiaxia Hydropower Station

J. CHEN[1], Y. JIA[2], L. RUAN[3], C. SUN[4], B. BAO[5], W. JIANG[6], T. WEI[7], X. ZHANG[8]
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A1 PS3 - Asset management and new challenges

ID: 10143
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Asset management and new challenges
Keywords: Generator, Short Circuit, Electrical Arc, Overpressure, Model

Calculation of Overpressure in the Enclosure of a Hydroelectric Generator during a Phase-to-Phase short circuit with electric arc

P. SCHLUPP
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ID: 10198
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Asset management and new challenges
Keywords: Hydro Generator, Stator Core, Mechanical Damage, EL CID, In-situ Repair

Mechanical degradation of hydro generator stator core: advanced diagnostics, on-site remediation, and engineering insights from a field case

S ADHIKARI*, I P RANJAN, S. K. MISHRA, J. PANI
NHPC Limited India

ID: 10754
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Asset management and new challenges
Keywords: Circulating current loss, Roebel transposition, Series connection, Temperature, Turbine generator, Armature winding

Theoretical and Experimental Evaluation of Hot-spot Temperature at Series Connection of Turbine Generators

K. HATTORI[1], K. KOBASHI[2], K. NAKAMURA[3]
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ID: 10757
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Asset management and new challenges
Keywords: Retaining ring, Turbine generator, Ultrasonic testing, Robotic system, Dry couplant, Non-destructive testing, Maintenance optimization

Development of an Ultrasonic Testing Robot for Retaining Rings in Turbine Generators

M. SAITO, F. SATO, S. MUKOYAMA, H. KATAYAMA
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ID: 10784
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Asset management and new challenges
Keywords: Reverse engineering, Esson's identity, hydro generator modernization, utilization factor

Heterogeneous Air Gap and Its Consequences Modelling Residual Magnetic Attraction Force

M. UEMORI[1], J. ROCHA[1], E. C. BORTONI[2]
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ID: 10785
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Asset management and new challenges
Keywords: Surge testing, turn insulation, field testing limitations, high-voltage stators

Theoretical Review and Precautions on Surge Testing Medium and High Voltage Stators in Fully Assembled Rotating Electrical Machines

R. FERREIRA[1], F. R. SPEZIA[2]
[1]Eletrobras Brazil; [2]WEG Brazil

ID: 10787
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Asset management and new challenges
Keywords: Vibration sparking, spark erosion, slot coating resistance, electrical degradation

Methodology to Estimate the Risk of Vibration Sparking (Spark Erosion)

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ID: 10789
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Asset management and new challenges
Keywords: Stator insulation, partial discharge, SFRA, hydro generator diagnostics

Assessment of the Electrical Insulation of the Stator Windings of a Large Hydrogenerator

J. NASCIMENTO, F. BRASIL
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ID: 10796
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Asset management and new challenges
Keywords: Condition monitoring, stator ovalization, vibration analysis, operational strategy

Condition-Based Operational Strategy for Life Extension of a Hydro Generator with Stator Ovalization

T. K. MATSUO, E. NASCIMENTO, R. MATOS, T. KLEIS, P. SILVA
AQTech Brazil

ID: 10797
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Asset management and new challenges
Keywords: Bulb generators, partial discharge, long-term monitoring, predictive maintenance

Partial Discharge Monitoring Experience in Bulb Generators

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ID: 10801
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Asset management and new challenges
Keywords: Dynamic eccentricity, unbalanced magnetic pull, vibration monitoring, diagnostic analysis

Case Study: Vibration Analysis for Detection of Unbalanced Magnetic Pull and Dynamic Eccentricity in a 200 MW Vertical Kaplan Turbine

E. NASCIMENTO, P. SILVA, T. KLEIS
AQTech Brazil

ID: 10821
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Asset management and new challenges
Keywords: Hydro Generator Diagnostics; Insulation Condition Assessment; Partial Discharge Monitoring; Health Indexing; AI-Assisted Asset Management

AI-Augmented Multi-Test Diagnostic Framework for health indexing in Hydro Generator Fleets

S. ADHIKARI[1], N. K. SINGH*[1], C. KOLEY[2], B. BHATTACHARJEE[3], A. TIWARY[1], J. PANI[1], P. KUMAR[1]
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ID: 11352
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Asset management and new challenges

Applied use of AI for stator winding insulation diagnosis using online PD monitoring

C. PINTO[1], S. P. JOHANSSON[2], J. ORTEGO[3], I. JARA[3]
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ID: 11536
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Asset management and new challenges
Keywords: motors, generators, rotating machines, resistive imbalance, electromagnetic imbalance, air gap eccentricity, open rotor bars, broken rotor bars, winding resistance, collapsed bearings

Detection of electromagnetic faults (air gap eccentricity, open rotor bars, connection issues) in induction rotating machines with off-line dual imbalance test through stator windings

D. PETSOV, S. ZUREK, J. JONES, T. RIVRON
Megger Instruments United Kingdom

ID: 11971
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Asset management and new challenges
Keywords: partial discharge, stator winding insulation, root cause identification, stator winding maintenance

New VHF Technology for Separating Partial Discharge Sources in Operating Stator Windings

M. SASIC[1], H. SEDDING[1], C. CHAN[1], G. STONE[2]
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ID: 12055
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Asset management and new challenges
Keywords: End Winding Vibration Sensor, Generator Maintenance, Water-cooled Generators, Stator Ground Fault

Mitigation and Prevention of Ground Faults in Water-Cooled Generators: A Case Study of Water Box Failures

K. THAMPANYASAKUL
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ID: 12237
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Asset management and new challenges
Keywords: generator, stator, winding, insulation, dielectric dissipation factor, tan d, power factor, tangens-delta, insulation ageing, diagnostic

Stator Insulation Performance: Six Decades of Experience

L. NILSSON[1], P. GENDRE[1], A. GENINI[1], M. ROHRBACH[1], D. RIESEN[1], O. KRONE[1], M. STOECKLI[2]
[1]BKW Energie AG; [2]ELECTROSUISSE / CIGRE Switzerland NC Secretary

ID: 12238
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Asset management and new challenges
Keywords: hydrogenerator, condition index, fleet management, maintenance strategy

Index-Based Fleet Management for Hydro Generators

L. NILSSON[1], P. GENDRE[1], A. GENINI[1], M. ROHRBACH[1], D. RIESEN[1], O. KRONE[1], M. STOECKLI[2]
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ID: 12331
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Asset management and new challenges
Keywords: Synchronous Generators, Maintenance, Intelligence System, Stress-Aware, Electro-thermal digital twin, Fuzzy logic decision-making, Operational stress tracking, Human observation integration, Machine learning extensions.

Stress-Aware Maintenance Intelligence System (SAMIS) of Synchronous Generators

J. DRAGOSAVAC[1], Ž. JANDA[1], I. KLASNIC[1], A. MIJAJLOVIC[1], N. LUKIĆ[2], A. LATINOVIC[3], M. ĐORĐEVIĆ[4]
[1]Nikola Tesla Institute of Electrical Engineering, University of Belgrade, Serbia; [2]Elektroprivreda Srbije AD, Serbia; [3]Center for Energy Excellence. Serbia; [4]School of Electrical Engineering, University of Belgrade, Serbia

ID: 12361
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Asset management and new challenges
Keywords: Hydrogen-cooled generators, Oil contamination, Oil sampling and testing, Seal oil, Seal oil ingress, Wear metals

Seal oil ingress in large turbo generators: A South African utility perspective

A. N. SINGH
Eskom

ID: 12400
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Asset management and new challenges

Digital Twin Implementations for Subsystems of Turbine Generators and Synchronous Compensators

S. MUSIELAK, H. STEINS, N. DAHRA, J. HOFFMANN, C. ROHR
Siemens Energy Global GmbH & Co. KG

ID: 12598
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Asset management and new challenges
Keywords: Vibration, Condition Monitoring, MEMS Accelerometers, Predictive Maintenance, Reliability Engineering

Vibration Severity Standards Development for MEMS-Enabled Condition Monitoring

M. NISHIOKA[1], E. CORAÇA[2], F. CARNEIRO[3]
[1]Tractian Brazil; [2]Tractian Brazil; [3]Tractian Brazil

ID: 12610
A1 POWER GENERATION AND ELECTROMECHANICAL ENERGY CONVERSION - Full Papers
Topics: A1 PS3 - Asset management and new challenges
Keywords: Interlaminar Short Circuit, Stator Core, Low Flux Loop Test, Generator, Magnetic Flux

Practical Detection Method of Stator Core Interlaminar Short Circuit for Turbine Generators

R. NAKANO[1], H. SAKO[2], S. HOSHI[3]
[1]Mitsubishi Generator Co., LTD. Japan; [2]Mitsubishi Generator Co., LTD. Japan; [3]Hitachi Mitsubishi Hydro Corporation Japan

A2 POWER TRANSFORMERS AND REACTORS

A2 PS1 - Major challenges to the power transformer industry

ID: 10146
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: LCA, copper, recycling, circular economy

Pilot project with recycled copper from a scrapped transformer

C. PERRIER[1], F. JACQUIER[1], S. LAURENT[1], A. TIMERA[2], V. MARCADON[2], A. LAFRAGETTE[2]
[1]GE Vernova; [2]RTE

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A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: Power Transformers - Design - Standardization - Lead Time - Statistical Distribution - Economic Feasibility - Supply Chain - Labor - Throughput

Reimagining Power Transformer Design: Standardization Strategies to Reduce Lead Times, Mitigate Supply Chain and Labor Challenges

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Prolec-GE Waukesha, United States of America

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Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: Partial, discharge, risks, metallic, contamination

Review of High Voltage failure risks under expanding supply chains: Case of Directed oil flow Transformers

D. G. SRIVASTAVA*, R. PATIL
Siemens Energy India Ltd

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A2 POWER TRANSFORMERS AND REACTORS - Full Papers
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Powering the RE Push: A Strategic Procurement Framework for Transformers and Reactors in India's Energy Transition

P. GUPTA*, P. K. CHAURASIA, S V S SATHYANARAYANA
POWERGRID

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A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry

Comprehensive Life Cycle Assessment and Carbon Footprint Evaluation of EHV Transformers: A Case-Based Approach

D. N. JHA*, M. KALORIA, S. RAY, G. AGRAWAL, N. SRIVASTAVA
POWERGRID

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A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: Internal Arcing - Power Transformer - Tank Rupture - Peak Pressure - Depressurization Time - Pressure Relief Device

Performance of Various Pressure Relief Devices to Internal Arcing in Power Transformers

D. HAMOIR[1], A. P. IYER[2], M. ELKARII[2]
[1]Transformer Protector Corporation, United States of America; [2]SERGI Transformer Protector, France

ID: 10253
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: Strategic, Acquisition, Transformers, Reactors, Optimizing

Strategic Acquisition of Transformers and Reactors: Optimizing Delivery Timelines, Managing Supply Chain Risks, and Workforce Constraints

R. M. DAS*, A. SINGH, S. SONI, A. KUMAR
POWERGRID, India

ID: 10279
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: Uprating power transformer, Load ability, Thermal Performance, Low viscosity oil, Bio-based Hydro Carbon Liquid

Uprating a Spare Transformer by Improving its Thermal Performance Using Bio-based Hydrocarbon Oils

R. LEICH[1], T. VAN DER HOEVEN[1], H. CAMPELO[2], M. TIRONI[3]
[1]DEP/Alliander; [2]Nynas AB; [3]ELETTROMECCANICA TIRONI Srl

ID: 10493
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: Temperature, Silver Suplhide

Redefining Transformer Operating Requirements: A Temperature Based Approach toMitigate Silver Sulphide

A. SULEIMAN[1,2], D. SUSA[3], C. EKANAYAKE[2]
[1]Ausnet Services, Australia; [2]University of Queensland, Australia; [3]GMB-TX

ID: 10645
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: Life Extension, Sustainability, Lifecycle Assessment, LCA, Transformer

Transformer Life Extension: GSU Transformers at Tucurui Dam. Case Study Around Vital Role in Sustainability, Resilience and Reliability.

M. HARADA[1], W. CALIL[1], G. PAJARO[2]
[1]Hitachi Energy Brazil; [2]Hitachi Energy Spain

ID: 10658
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: circuit breaker, shunt reactor, transient, overvoltage

Dielectric Withstand Evaluation for Shunt Reactors due to Disconnect Switching Transients

J. MONTANHA[1], R. ANTUNES[2], A. ROCHA[3], T. MANTHE[4]
[1]Siemens Energy Brazil; [2]ONS Brazil; [3]ATG Brazil; [4]Siemens Energy Germany

ID: 10661
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: High-frequency electromagnetic transients; white-box analytical model; controlled impulse testing in the laboratory

Analysis of High Frequency Electromagnetic Transients in Transformer Windings through White Box Modelling and Experimental Measurements

T. B. MARCHESAN[1], M. P. STOCHERO[1], V. C. BENDER[1], R. C. BELTRAME[1], M. C. C. VIEIRA[1], L. H. MEDEIROS[1], S. TENBOHLEN[2], F. L. PROBST[2]
[1]Federal University of Santa Maria Brazil; [2]University of Stuttgart Germany

ID: 10750
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: Power Transformer Protection - Grid Resilience - Physical Security - Loss of Oil - Autonomous Protection Scheme - Critical Infrastructure Reliability

Transformer Loss of Oil Lockout (LOL) Enhancing Grid Resiliency Against Physical Attacks

S. FITZGERALD, B. GUREVICH, T. LUTES
ComEd, United States of America

ID: 10758
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: Advanced simulations and engineering, Site assembly, Transportation, Yoke-split structure

Innovative Technology of Site Assembly Transformer: Overcoming Transportation Challenges for Large Power Transformers

M. HABUKAWA[1], K. YAMAGUCHI[1], M. KADOWAKI[1], M. CUESTO[2], R. LLAMUZA[2], K. SETHI[3]
[1]Hitachi Energy Japan; [2]Hitachi Energy Spain; [3]Hitachi Energy Germany

ID: 10760
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: Gas, insulated Transformer (GIT), Natural Origin Gas, SF6, free

66 kV-20 MVA Gas insulated Transformer Using Natural Origin Gas (N_2) with Reduced Environmental Load and Improved Maintainability

N. NOGUCHI[1], T. ISHIKAWA[1], S. TSUKAO[2], K. UCHIDA[1], T. CHIGIRI[1], K. TAKANO[1]
[1]Toshiba Energy Systems & Solutions Corporation Japan; [2]TEPCO Power Grid, Inc. Japan

ID: 10761
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: Insulation paper, Lifetime evaluation, Natural ester, Retrofill, Transformer

Evaluation of Temperature Rise and Insulating Paper Lifetime in Retrofilling Transformer with Natural Ester

T. HOMMA, S. MIYAZAKI, Y. MIZUTANI
Central Research Institute of Electric Power Industry Japan

ID: 10771
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: Global Supply chain value, Optimization, Transformer procurement process

A South African case study on transformer procurement process optimization for a constrained global supply chain value

M. HLAKUDI, S. MTETWA
National Transmission Company South Africa (NTCSA)

ID: 11015
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: life cycle cost, dry-type air-core reactors, sustainable substations, environmental hazards, aasset management

Real Case Study Assessment of Technical, Environmental, Social and Financial Benefits of Dry-Type Air Core Reactor Technology

L. d. N. PEREIRA[1], A. ASGEDOM[2], G. ZHOU[2]
[1]TEEE Brazil; [2]TEEE China

ID: 11052
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: transformer, load losses, finite element method, FEM, machine learning, ML

"Transformer Load Losses prediction by means of Finite Element Method Simulations and Machine Learning"

L. CANTINI
Hitachi Energy, Italy

ID: 11053
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: reliability, short circuit withstand test

Terna requirements for Short Circuit Withstand Test

S. SACCO
TERNA, Italy

ID: 11354
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry

275 MVA Power Transformer Noise Reduction, innovation, sustainability and asset performance

G. PAJARO[1], Z. A. AL SHAIBA[2], A. SERT[3], A. JOSEPH[4]
[1]Hitachi Energy, Spain; [2]KAHRAMAA, Qatar; [3]PECHOM, Turkey; [4]Hitachi Energy, Qatar

ID: 11422
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: Advanced Insulation System - Aramid Pressboard and Paper - Ester Liquid – Mobile Plug & Play Transformer - Grid Resilience - Fast Deployable Transformer - Rapid Response – Interchangeability - Reconnectable Multi-rated Transformer - Overload Capability

Advancements in Resiliency Transformers: Case of a 58/65/93 MVA Reconfigurable Area Station Transformer

R. SZEWCZYK[1], J.-C. DUART[2], A. O'MALLEY[3], R. WIND[4], E. SCHWEIGER[5]
[1]DuPont, Poland; [2]DuPont, Switzerland; [3]Consolidated Edison Co. of NY, USA; [4]Siemens Energy, Austria; [5]Siemens Energy, Germany

ID: 11453
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: 500 kV Substation, Assembled Transformer, Transformer Body Noise Level Measurement, Substation Boundary Noise Level Prediction, Sound Source Correction Coefficient

Establishment Method of Correction Factors for Noise Level Prediction about 500 kV Combined Transformers Based on Field Measurement Analysis

D. WANG[1], Z. ZHANG[1], Z. SUN[2], M. WANG[3], F. WANG[1], S. JI[4], L. YING[5]
[1]State Grid Henan Electric Power Research Institute; [2]State Grid Henan Electric Power Company; [3]State Grid Corporation of China; [4]Xi'an Jiaotong University; [5]Wuhan University

ID: 11659
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: Converter transformer, eddy loss, harmonic load, finite element method, IEC 61378-1:2011

Calculation of Winding Eddy Losses in Converter Transformers Based on IEC 61387:1-2011 Formulations and FEM

E. AKYÜZ[1], S. ÇÜRÜKOVA KALE[1], O. SÖNMEZ[1], B. ALBOYACI[2], Y. B. DEMİROL[3]
[1]Sönmez Transformatör; [2]Kocaeli Üniversitesi; [3]Genetek Güç & Enerji

ID: 11723
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry

From Complexity to Efficiency: Standardized Transformer Procurement to Mitigate Supply Chain Disruptions

A. AGUADO, I. ARICETA, J. FRIAS, M. MARTÍNEZ
i-DE Redes Eléctricas Inteligentes, Spain

ID: 11730
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: Acoustic Modeling - Finite Element Optimization - Grain-oriented Electrical Steel - Modal Analysis - Shear Modulus - Transformer Noise

Optimization Study of the Shear Moduli of Magnetic Foil-Sheet and Its Implication into the Noise Simulation

L. MICHALSKI[1], V. MURGIDA[2], L. DE MERCATO[2]
[1]Hitachi Energy Poland; [2]Hitachi Energy Italy

ID: 11825
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: Arctic temperatures - Cold start - ONAN - Transformer oil - Thermal response

Studying Cold-Start Thermal Response of Oil-Immersed Power Transformers at Low Ambient Temperatures

M. H. A. HASSAN[1], I. MADSHAVEN[2], K. NIAYESH[1], Ø. L. G. HESTAD[1], F. BACHINGER[3], A. C. MERMIGKAS[2], H. CAMPELO[4], U. PLAZNIK[5]
[1]Department of Electric Energy Norwegian University of Science and Technology (NTNU); [2]Electric Power Technology SINTEF Energy Research; [3]Siemens Energy Austria Gmhb Linz; [4]Nynas AB; [5]Kolektor Etra d.o.o

ID: 11955
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: Power transformer, shunt reactor, tap-changer, offshore substation (OSS), floating offshore substation (FOSS), maintenance guidelines, corrosion protection, condition monitoring

Maintenance Guidelines for Offshore Applications

T. STIRL[1], D. KOCH[2], P. WISCHTUKAT[3], T. BOROOMAND[4]
[1]GE Vernova, Germany; [2]GE Vernova, Germany; [3]Göbel; [4]GE Vernova, UK

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A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry

Dynamic Load Analysis of Sealing Mechanisms in Floating Offshore Structures

G. A. MORLET[1], J.-J. RUIZ[2], S. BRODEUR[3], T. NOVAK[4]
[1]Hitachi Energy, Germany; [2]Hitachi Energy, Spain; [3]Hitachi Energy, Canada; [4]Hitachi Energy, Poland

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A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry

An improved risk management model for a fleet power transformer through reliability asset condition and probability of failure using weibull analysis

L. RESTREPO
CELSIA

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A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry

Methodology for the Qualification of New Supplier Factories at Utility: A Strategic Response to the Challenges of the Energy Transition

A. HERREÑO[1], F. IBAÑEZ[2]
[1]ISA; [2]ISA

ID: 12240
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: carbon footprint, transformer manufacturing, lifecycle assessment, LCA, energy consumption, waste management, data quality, environmental impact

Carbon Footprint of Transformer Manufacturing

B. BOSNJAK[1], E. PEREZ[2], C. PERRIER[2], S. MICHAUD[2], T. STIRL[3], M. STOECKLI[4]
[1]GE Vernova Switzerland; [2]GE Vernova France; [3]GE Vernova Germany; [4]ELECTROSUISSE / CIGRE Switzerland NC Secretary

ID: 12241
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: transformer, ambient temperature, CFD, numerical modelling, climate change, transformer loading

Impact of Climate Change on Power Transformer Lifetime

B. BOSNJAK[1], S. ERDEM[2], M. STOECKLI[3]
[1]GE Vernova Switzerland; [2]GE Vernova Turkey; [3]ELECTROSUISSE / CIGRE Switzerland NC Secretary

ID: 12374
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: AI-DATACENTER, DISTRIBUTION TRANSFORMER, SKID- MOUNTED SUBSTATION

Advanced dry-type transformer design solution for hyperscale AI-datacenter application

M. SVOBODA[1], L. SPECKNER[2], D. BROCILO[3]
[1]SGB Group, s.r.o.; [2]SGB Germany; [3]META

ID: 12412
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: Chemical reaction, Insulation oil preservation, Moisture compensation, Oxygen reduction, Power transformer aging, Static oxygen absorber, Transformer maintenance, Transformer reliability

Experimental Investigation and Field Validation of a Chemical-Based Oxygen Reduction Method for Oil-Immersed Power Transformers

M. MOH'D[1], R. BARDEN[2], P. WERLE[3], U. MAIER[4]
[1]50Hertz Transmission GmbH, Germany; [2]Albert Maier GmbH, Germany; [3]Leibniz University Hannover, Germany; [4]Albert Maier GmbH, Germany

ID: 12418
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: Power transformer 765 kV, ester liquids, sustainability, innovation, fire safety.

World's largest 765 kV ester transformer for enhanced safety and environmental protection in electrical grids

D. VUKOVIĆ[1], M. CUESTO[2], K. SETHI[1], R. LIAMUZA[2]
[1]Hitachi Energy, Germany; [2]Hitachi Energy, Spain

ID: 12438
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: Integrated on-load tap-changer – FEM simulation – dielectric strength – compact design – sustainability

Novel Method for dielectric Integration of Integrated Tap-Changer based on 3D-FEM Simulation for compact transformer design

S. REHKOPF, B. GLASER, M. BENGLER
Maschinenfabrik Reinhausen Germany

ID: 12494
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: Sustainability, dry-type transformers, LCA, EPD, low carbon materials, environmental sensitivity analysis, cradle to gate, cradle to grave, CO2 footprint, alternative materials.

Assessing the impact of low carbon materials on a dry type transformer: Case study of a 1.6 MVA transformer

D. GONZÁLEZ[1], M. BERROGAÍN[2], R. NIINA[3]
[1]Hitachi Energy, Germany; [2]Hitachi Energy, Spain; [3]Tampere Raitiotie Oy, finland

ID: 12499
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: Ultra-high voltage (UHV) converter transformer, Pressure Relief Valve (PRV), DN400 Large Diameter, Arc Test

Investigation of a DN400 Large-Diameter Pressure Relief Valve: Design, Manufacturing, and Arc Performance

J. LI[1], L. LUO[2], Y. ZHAO[2], K. WANG[2], H. ZHANG[3]
[1]China Electric Power Research Institute; [2]Hefei University of Technology; [3]China University of Mining & Technology

ID: 12607
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: Medium-size transformers, No-load loss, Loss separation, Steinmetz equation, XGBoost, Optimization

Modelling No-Load Losses in Distribution Transformers: A Comparison Between Physical and Machine Learning Approaches

M. KIANI-OSHTORJANI[1], G. KALKAN[2], A. KIRCHNER[3], F. DEHLAS[4], R. FLURI[5]
[1]Rauscher & Stoecklin AG Switzerland; [2]R&S Group AG Ireland; [3]R&S Group AG Switzerland; [4]Rauscher & Stoecklin AG Switzerland; [5]R&S Group AG Switzerland

ID: 12624
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS1 - Major challenges to the power transformer industry
Keywords: Design, EMTP, Reliability, Reactive Power Compensations, Thyristor-controlled Transformers

Electromagnetic design of a Thyristor-Controlled Transformer for Dynamic Reactive Power Control

A. SANTACROCE[1], G. TRESSO[2], P. VACANTE[3], S. SACCO[4], L. BUONO[5], E. ROTOLO[6], F. PALONE[7]
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A2 PS2 - Power transformer digitalisation journey

ID: 10148
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey
Keywords: Power transformer bushing, low power instrument transformer, measurement accurancy, monitoring

Power transformer dry type bushing embarking combined low power instrument transformers. Impact of the mutual influence on the accurancy

E. FAKHRI[1], C. ELLEAU[1], J. ZHUO[2], B. PAYA[1], L. BASUYAUX[1], E. EUVRARD[2]
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ID: 10149
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey
Keywords: Power transformer, digitalization, Lifecycle management

Digitalization of transformer data for enhanced lifecycle management

R. DESQUIENS, D. BORTOLOTTI, S. FLET, L. PAULHIAC, A. LEFEVRE, C. ELLEAU
EDF

ID: 10207
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey
Keywords: Digital Mirror, Power Transformers, Reactors

Development of a Digital Mirror for Power Transformers and Reactors

D. N. JHA*, M. KALORIA, D. PAUL, R N GUPTA
POWERGRID

ID: 10209
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey
Keywords: Artificial Intelligence, Machine Learning, Dissolved Gas Analysis, Fault Prediction, Health Assessment, Condition Monitoring, Residual Life Assessment, Transformer models.

Leveraging Artificial Intelligence for Transformer and Reactor Health Assessment and Aging Estimation Amandeep SINGH* Richik Manas DAS Gunjan AGRAWAL Abh

A. SINGH*, R. M. DAS, G. AGRAWAL, A. KUMAR
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ID: 10220
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey
Keywords: Transformers - Condition Assessment - AI Boosted

AI Boosted Transformer Life Management

L. CHEIM
Hitachi Energy, United States of America

ID: 10270
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey
Keywords: Congestion, Dynamic Rating, IEC60076-7, Power Transformer, Thermal Modelling, Open source

Dynamic Transformer Rating (DTR) on large three winding power transformers in the transmission grid of the Netherlands

R. SCHELLEVIS[1], T. VAN DER HOEVEN[2], B. ROS[1], J. SLANGEN[1], P. SLOOTS[3]
[1]TenneT TSO; [2]DEP/ Alliander N.V.; [3]Royal SMIT Transformers BV

ID: 10385
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey
Keywords: Twin, Moisture, Sensing

Digital Twin for Transformer Moisture Management: Closing the Loop from Sensing to Action

O. ROIZMAN[1], P. GREY[2]
[1]IntellPower, Australia; [2]Powercor, Australia

ID: 10706
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey
Keywords: data templating, digitalisation, transformer nameplate, XML

A proposed data model for a standardised power transformer nameplate, design and parameter dataset

C. WOLMARANS[1], R. DESQUIENS[2], T. GRADNIK[3], F. OSTERMAN[4], Z. DRAPER[5], M. SOTO[6], G. LINORTER[7], V. DURINA[8]
[1]GE VERNOVA; [2]EDF; [3]EIMV; [4]MR; [5]DELTA X RESEARCH; [6]HITACHI ENERGY; [7]SIEMENS ENERGY; [8]KONCAR INSTITUTE

ID: 10707
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey
Keywords: AI, ML, DATA, TRANSFORMER, ALARMS, DGA

Leveraging data and metadata for effective deployment of AI/ML in transformer monitoring and diagnostics

C. WOLMARANS, R. LUKE, A. DEY
GE VERNOVA

ID: 10762
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey
Keywords: Dynamic Rating, Monitoring Device, Online DGA

Development of Transformer Monitoring Device using IoT technology for Condition Based Maintenance

T. KANAMORI[1], Y. ITOU[1], H. ISAJI[1], A. IWATA[1], J. KUSANO[2], S. ITO[2]
[1]Chubu Electric Power Grid Co., Inc. Japan; [2]AICHI ELECTRIC Co., Ltd. Japan

ID: 11054
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey
Keywords: digitalisation, BIM, data, asset, asset management

Power Transformer Digitalisation. Terna approach on BIM

E. ROTOLO
TERNA, Italy

ID: 11092
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey
Keywords: Power Transformer, CFD, THNM, Natural Ester

Improving thermal-hydraulic modelling accuracy in CORE-Type transformers: a dynamic THNM approach.

B. OLIVEIRA, S. COUTO, R. CASTRO LOPES
EFACEC

ID: 11093
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey
Keywords: Phase-Shifting Transformers (PSTs), Shell Type, Digital Modelling, Grid Flexibility, Dissociated Phases Design

Addressing key design challenges through digital modelling of dissociated phases phase-shifting transformers

M. MAIA, A. SOTO, P. LIMA, R. CASTRO LOPES
EFACEC

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A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey
Keywords: Shell-type Transformer, Fluid Properties, Thermal Performance, Biodegradable Insulating Liquids

Modelling the thermal-hydraulic behaviour of shell-type power transformers: on the influence of fluid properties in OD and ON cooling modes

S. COUTO[1], M. CASTRO[1], H. CAMPELO[2], P. WEDIN[3], A. SOTO[1], R. CASTRO LOPES[1]
[1]EFACEC; [2]NYMAS AB (PORTUGAL); [3]NYMAS AB (SWEDEN)

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A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey

Cooling Pattern Optimization for shell-type power transformers

P. QUINTANILLA[1], E. SANCHEZ[1], R. DESQUIENS[2], D. BORTOLOTTI[2]
[1]Hitachi Energy, Spain; [2]EDF, France

ID: 11489
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey
Keywords: Transformer, Partial Discharge, Defect Location, Ultra-High Frequency

Development of a Digital Twin-Based Transformer Partial Discharge Diagnostic System

B.-W. MIN, D. LEE, K.-D. BAE, J.-B. LEE
HD Hyundai Electric

ID: 11494
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey
Keywords: UHV power transformer; Bushing turret; Internal arcing fault; Structure failure; Explicit dynamics

Improved arc containment of a bushing turret of UHV AC Transformers under a high-energy internal arcing fault

J. SUN[1], Y. ZHAO[1], L. LUO[2], W. XU[2], K. WANG[1], J. LI[3]
[1]China Electric Power Research Institute; [2]Hefei University of Technology; [3]Xi'an Jiaotong University

ID: 11828
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey
Keywords: Cellulose ageing, transformer lifetime, water content, digital twin, monitoring, capacitive humidity sensor, methanol, DP

Capacitive humidity sensors for transformer ageing monitoring

H. ENOKSEN[1], L. LUNDGAARD[1], K. LILAND[1], A. S. TØDENES[2], S. KYRKJEEIDE[3], S. LEIVO[4]
[1]SINTEF Energi; [2]Hitachi Energy; [3]Statnett; [4]Vaisala

ID: 11862
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey
Keywords: Power transformers, digital twin, digitalisation, monitoring, condition assessment, artificial intelligence

Development of Digital Twin Technologies for Power Transformers: A Multi-Disciplinary Initiative at a Large Utility

P. PICHER, M. KIROUAC, R. ZEMOURI, O. ARROYO, M. RODRIGUEZ, M. DUVAL, N. SENECHAL, M. CEA, A. SERVENTI, M. GAUVIN, S. PROULX, M. LALONDE, E. FRENETTE, G. BIZIER
Hydro-Québec

ID: 11865
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey
Keywords: Smart, Transformers, Renewable, Energy

Smart Transformers: An Integrated Solution for Grid Visibility and Asset Management in Renewable Energy and Data Center Applications

L. F. SANCHEZ GOMEZ, F. SALDIVAR CERON, C. GAYTAN CAVAZOS, O. MENDEZ ZAMORA
Prolec-GE Internacional

ID: 11885
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey
Keywords: automation of measurement, digitalization, test bay

Transformer Test Bay Digitalization: Unified Platform for Workflow Automation

F. RAZUM[1], P. MIHOKOVIĆ[2], P. KRIŽIĆ[1], M. ŠTANFEL[2]
[1]Electrical Engineering Institute Ltd., Croatia; [2]KONČAR - Distribution and special transformers Inc., Croatia

ID: 11985
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey
Keywords: coil monitoring system, air-core reactor, predictive maintenance, field deployment, retrofit installation, wireless sensor node

Innovative Wireless Monitoring System for Air-Core Reactors – Experience from Field Deployment and Insights for Predictive Maintenance

C. KOHLBERGER[1], R. GRIVOT[2], A. ALHAFARI[1], I. RULYOV[1], A. AICHHORN[1]
[1]Trench Austria GmbH; [2]RTE France

ID: 11987
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey

Grid Load Optimization with Transformer Thermal Digital Twin

F. BELAVIĆ[1], J. RAITH[2], M. STOESSL[2]
[1]Austrian Power Grid AG; [2]Siemens Energy Austria GmbH

ID: 12378
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey
Keywords: Evidence Theory - Machine Learning - Online Monitoring - Transformer Health Index

Transformer health index calculation using evidence theory and machine learning, with consideration of online monitoring data

O. RESING[1], J. FUESER[1], H. HIRSCH[2]
[1]Westnetz GmbH; [2]University of Duisburg-Essen

ID: 12405
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey
Keywords: OLTC, Vibroacoustic, VAM, Digitalization, Reference, Signature, Monitoring, Condition, Interpretation, Fingerprint

Digital Fingerprinting of OLTCs via Vibro-Acoustic Measurements During Factory Acceptance Testing

M. AUERHAMMER, A. SAVELIEV, M. FOATA, M. WOLFRAM, K. RÄDLINGER, S. CREEVY
Maschinenfabrik Reinhausen Germany

ID: 12493
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey

Transient Voltage Analysis of a Large 250 MVA Three-Winding Transformer with a Frequency-Dependent Modeling Approach

M. ESLAMIAN[1], E. RAHIMPOUR[2], K. SETHI[1]
[1]Hitachi Energy, Germany; [2]Technical University of Applied Sciences Würzburg- Schweinfurt (THWS) Germany

ID: 12597
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey
Keywords: Phase-shifting transformers, DC hysteresis, topological model

Measurement-Based Electromagnetic Modelling of Phase-Shifting Transformers with Limited Design Data

A. FRÖHLICH[1], D. ALBERT[2], G. LEBER[3], H. RENNER[4]
[1]Graz Univesity of Technology Austria; [2]OMICRON electronics Gmbh Austria; [3]Siemens Energy Austria Gmbh Austria; [4]Graz University of Technology Austria

ID: 12616
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS2 - Power transformer digitalisation journey
Keywords: Power transformer, Inrush current, circuit breaker, Machine Learning, Reinforcement Learning, Jiles-Atherton, Proximal Policy Optimization

Power Transformer Modelling and Advanced Intelligent Techniques for Inrush Current Minimization Studies

J. UGARTE-VALDIVIELSO[1], M. BARRENETXEA[2], J. I. AIZPURUA[3]
[1]Electronics & Computing Science Department, Mondragon University Spain; [2]Electronics & Computing Science Department, Mondragon University Spain; [3]Department of Computer Science and Artificial Intelligence, University of the Basque Country (UPV/EHU)

A2 PS3 - Failure prevention, detection and investigation

ID: 10145
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Short-circuit, calculation, full scale test, on site failure

Short-circuit failure experience . Comparison of reliability depending on validation process

J.-C. RIBOUD, R. BLANC, A. TIMERA
RTE

ID: 10150
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Bushing, Leakage Current, Online Monitoring, Early Warning, Capacitive Layer Degradation, Transformer Fire Prevention, Signal Processing

Online monitoring of RIP Bushings for early failure detection

D. BORTOLOTTI, R. DESQUIENS, T. DELAGNES, L. PAULHIAC, A. LEFEVRE, J. SANCHEZ
EDF

ID: 10236
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: DFR, Diagnostics, Transformer, Bushings, Laboratory, Studies

DFR-Based Diagnostics of Transformer Bushings: Insights from Field and Laboratory Studies

G. NIKAM*, P. RAO
Yash HighVoltage Ltd, India

ID: 10238
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Diagnosis, Shunt, Reactor, attributed, Electrostatic, Shield

Diagnosis of fault in Shunt Reactor attributed to Core Electrostatic Shield: A Case Study Analysis

S. S H RAY*, R. SRIVASTAVA, G. AGRAWAL, K. RAO
POWERGRID, India

ID: 10243
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation

Abnormality and Failure Analysis and Remediation of Power Transformers and Reactors: Field Case Histories and Engineering Insights

D. D. CHAKRABORTY*, R. M. DAS
POWER GRID CORPORATION OF INDIA LTD, India

ID: 10244
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation

Predictive failure forecast using Exponential Time-Series modelling of Dissolved gases in Converter Transformers

D. N. JHA*, D. PAUL, P R S YADAV, R. SRIVASTAVA
POWERGRID, India

ID: 10248
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Failure detection, investigation, 420KV Line, Reactor

Failure detection, investigation and root cause analysis of 420KV Line Reactor in POWERGRID

R. RANJAN*, R. K. JAIN, P. YADAV, R. MANAS
POWERGRID India

ID: 10250
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Analysis of Shunt, Reactor, Failure, Switching, Operations, Line Faults

Failure Analysis of Shunt Reactor during Switching & Line Faults in POWERGRID

G. AGRAWAL *, S. S H RAY, A. K. TEWARI, R. M. DAS, A. SINGH
POWERGRID, India

ID: 10252
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Fatigue, Damage, Vulnerability, Shunt, Reactor

Predicting Fatigue Damage and Vulnerability of a Shunt Reactor Due to Structural Vibrations

D. P. SHARMA*, A. PATHAK
CG Power & Industrial Solutions Limited, India

ID: 10255
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Predictive, analysis, machine, learning, modelling

Predictive analysis using machine learning modelling of digital twin of a Power Transformer

R. R. ALAPATT*, R MEERAKRISHNA
Power Grid Corporation of India Ltd , India

ID: 10272
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Acoustic Emission, Applied Voltage, Dielectric Testing, Electromagnetic Interference Immune Sensor, Factory Acceptance Testing, Fiber Optic Acoustic Emission Sensing Technology, Lightning Impulse, Localization, Partial Discharge, Switching Impulse

Localization of Partial Discharges and Dielectric Disturbances During Factory Acceptance Testing of Power Transformers Using Fiber Optic Acoustic Emission Sensing

S. VOETEN[1], H. HASHEMI-DEZAKI[2], A. ZADEH[2]
[1]Royal SMIT Transformers; [2]Optics11

ID: 10345
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Failure Analysis, Teardown, Shunt Reactor, High Impedance

Failure Analysis and Teardown Inspection of Transmission Shunt Reactor in High Impedance Complex Transmission Network Power System

M. BHATTI[1], G. PAJARO[2]
[1]Hitachi Energy, Australia; [2]Hitachi Energy, Spain

ID: 10386
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Demonstrating, Moisture, Failures, Elusive

Demonstrating Moisture as a Major Contributor to Transformer Failures: The Elusive Link Revealed Through Detailed Case Studies

P. GREY[1], O. ROIZMAN[2]
[1]Powercor/CitiPower, Australia; [2]IntellPower, Australia

ID: 10497
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Transformer, Impulse voltage, Surge distribution, Series reactor, Transferred surge, Insulation stress, Series capacitance

Impulse Voltage Distribution and Transferred Surge in Transformer Winding with Series Reactor – a Case Study

A. BOHRA, A. INDARTO, S. WAHYUDI, K. HARJO
Elsewedey Electric, Indonesia

ID: 10660
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Thermal Performance Assessment of Power Transformer Winding; optical fiber measurement; computational fluid dynamics; thermal-hydraulic network model

Thermal Performance Assessment of Power Transformer Winding Through Experimental, Analytical and Numerical Analysis

T. B. MARCHESAN[1], L. H. MEDEIROS[1], M. M. OLIVEIRA[2], C. E. G. FALCÃO[1], V. C. BENDER[1]
[1]Federal University of Santa Maria Brazil; [2]Federal University of PAMPA Brazil

ID: 10663
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: electromagnetic performance; modelling transformers and reactors; High-frequency transient studies

High-Frequency Transient Studies: Modelling Transformers and Reactors from Field Measurements and Design Data

O. IARONKA[1], D. SCHMITT[1], A. ROCHA[2]
[1]Trinse Consulting Brazil; [2]ATG Consulting Brazil

ID: 10685
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Transformer - Diagnostics - Offline Testing - Insulation Assessment - Electromechanical Integrity

Electromechanical Assessment of Power Transformers Based on Novel Offline Testing Techniques

D. M. ROBALINO[1], R. E. ALVAREZ[2]
[1]Megger, United States of America; [2]IITREE-FI-UNLP, Argentina

ID: 10763
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Dissolved Gas Analysis, Photovoltaic power generating systems, PCS, IBRs, Iron core loss, Load fluctuations, Oil-filled transformers

Influence of Harmonics and Load Fluctuations on Dissolved Gas Analysis for Oil-Filled Transformers Connected to Photovoltaic Power Generating Systems

H. YOSHIKAWA[1], G. SATO[1], Y. KONISHI[1], S. MATSUMOTO[2]
[1]Yuka Industries Co., Ltd. Japan; [2]Shibaura Institute of Technology Japan

ID: 11028
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation

Case Studies on Diagnostic Integration: Challenges and Findings in the Condition Assessment of 500 kV Transformers and Reactors

R. ALVAREZ, L. CATALANO, V. CARBAJAL
IITREE-FI-UNLP

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A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation

Guidelines for Root Cause Analysis of Failures in Transformers Connected to Wind Turbines

R. ALVAREZ, L. CATALANO, V. CARBAJAL, V. TOMPKINS, P. MORCELLE DEL VALLE
IITREE-FI-UNLP

ID: 11095
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation

Artificial intelligence enhanced online condition monitoring of On-Load tap changers in power transformers based on electrical signature

G. ABRANTES, G. SANTOS, R. DUARTE, J. ESTIMA, M. FERREIRA
ENGING

ID: 11160
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Power transformers, windings, frequency response analysis, condition assessment

Approaches to the Interpretation of Frequency Response Analysis for Rapid Condition Assessment of Power Transformers

V. LARIN[1], D. MATVEEV[2], M. FROLOV[2], R. KURNYSHOV[1], B. LESIN[3], D. GUREV[3], A. KOZHEVIN[3], V. ABRAMOV[3]
[1]VEI – branch of RFNC-VNIITF; [2]MPEI; [3]SVEL – Power transformers

ID: 11263
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Asset Health Index, Transformer Failures, Predictive Maintenance, Resilience Investment, Reliability Engineering, Condition Assessment, Risk-Based Planning

From Prediction to Reality: Assessing the Predictive Value of Transformer Asset Health Index Models

M. GRISARU[2,1], T. ATALLA[1], M. ELLENBOGEN[1]
[1]Israel Electric Company; [2]Independent Consultant

ID: 11269
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Condition Monitoring, maintenance, power transformer, tap changer

Improvement of a tap changer condition-monitoring approach for predictive maintenance purposes

S. MTETWA, M. HLAKUDI, S. MIYA
National Transmission Company South Africa (NTCSA)

ID: 11279
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Transformer, Shunt Reactor, Failure, Investigation, Inspection, Testing

Experience with Transformer and Shunt Reactor Failure Investigation at a Large Transmission Network Operator

S. RYDER[1], A. BAJWA[1], R. HOOTON[2]

[1]Doble PowerTest Great Britain; [2]National Grid Great Britain

ID: 11357
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation

Impact of switching transient overvoltages in dry-type transformers

V. M. GARCÍA[1], C. ROY[1], A. NOGUÉS[1], L. OLIVEIRA[2]
[1]Hitachi Energy, Spain; [2]Hitachi Energy, Brazil

ID: 11487
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Power Transformer, Short-circuit Withstand Capability, Dynamic Calculation Method, Cumulative Effect

Dynamic Calculation Method for Transformer Short-Circuit Considering Cumulative Effects

P. LI[1], Z. ZHANG[2], H. SUI[2], K. WANG[2], S. ZHANG[2]
[1]SGCC Southwest Branch; [2]China Electric Power Research Institute

ID: 11495
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Weakly-supervised, Faster RCNN, Infrared Image Recognition, Fault Detection

Weakly-supervised Infrared Image Recognition Method for Substation Equipment Fault Detection

Z. XIE, J. DENG, H. ZHOU, Z. PAN
China Southern Power Grid

ID: 11508
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: DGA, synthetic ester, wind energy generation

Analysis of DGA Data of Wind Farm Transformers Filled with Synthetic Ester

M. DAGHRAH[1], M. RAHMBEKSCH[2]
[1]Shell U.K. Oil Products Ltd U.K; [2]ENERCON GmbH Germany

ID: 11544
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: copper sulphide, corrosive sulphur, DBDS, transformer oil, transformer failure, insulation degradation, oil analysis, CIGRÉ TB 625, condition monitoring, DGA, IEC 60296, asset management

Corrosive Sulphur in Transformer Oil: Root Cause Analysis, Risk Mitigation, and Field- Based Action Framework

S. ALLABAN, A. ALJOUF, A. ALAMEER, F. ALKHATER
SABIC

ID: 11627
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Power Transformers, Transformer Online Monitoring, TMS, Return of investment, ROI, CM, Condition Monitoring

Optimum Utilization of Transformer online Monitoring Systems in Electricity Transmission Network (Kahramaa approach)

Z. ALSHAIBA, M. ELSAHARTY
Qatar General Electricity &Water Corporation (KAHRAMAA)

ID: 11662
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Power Transformer, Reactors, DGA, Electrical Test, Partial Discharge

Case Studies of PD Measurement Experiences on Site Maintenance and in Workshop Fault Investigations of Oil-filled Power Transformers and Shunt Reactors

M. YANAN, T. GÜNEŞ, L. KAHTALI, İ. ÇALIŞKAN, M. TORUN
Turkish Electricity Transmission Corporation

ID: 11716
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Arc resistant design, design pressure equation, explicit dynamics simulation, finite-element analysis, high-energy arcing fault, liquid-immersed power transformer, pressure, tank rupture, transformer tank design

Update of a design pressure equation for power transformers under high-energy arcing faults

J.-B. DASTOUS, S. BÉLANGER
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ID: 11718
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Power Transformer, high-energy arcing fault, bushing turret, rupture prevention

Design and Manufacture of an Arc-resistant 250 MVA, 735 kV Transformer with Reinforced Side Turrets

S. BRODEUR[1], P. LAMOTHE[1], J.-B. DASTOUS[2]
[1]Hitachi Energy Canada; [2]Hydro-Québec, Canada

ID: 11719
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Transformer, Short Circuit Failure, Cases

Transformer Short Circuit Failure Case Histories

E. TENYENHUIS
Hitachi Energy Canada

ID: 11735
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation

Dynamic Analysis using FEM and SC-Withstand Test for Verification of Short Circuit Withstand Capability of a 600MVA, 405kV Auto-Transformer

D.-H. KWAK[1], M.-S. KANG[2], J.-C. RIBOUD[3]
[1]Hyosung Korea; [2]Hyosung Korea; [3]RTE France

ID: 11893
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Deep-Reinforcement-Learning; Digital Twin; Fuel-Optimal Control

Advanced Diagnostics and Failure Prevention in Power Transformers: Dual Case Study Investigations of Magnetic Flux Leakage and Cellulose Insulation Degradation at Samra Electric Power Company (SEPCO), Jordan

Y. MASHAGBEH, S. ALBATTAT
SEPCO-Samra Electric Power Generating Co

ID: 11897
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation

A Diagnostic Approach Using SFRA: Comparative Analysis of Twin Distribution Transformers

R. ABWAINI, M. ALMOMANI, E. SHTAYAT
Irbid district Electricity Company (IDECO)

ID: 11980
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation

Phase Shifting Transformer On-Site Testing – Best Practice

D. ALBERT[1], A. PIRKER[2], T. BEDNARCZYK[1], B. ENGSTLER[1]
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ID: 11981
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: transformer short-circuits, axial winding forces, dynamic axial short-circuit force response, Spiraling effects in transformer windings, winding spiraling failure modes, dynamic axial winding models, lumped mass non-linear spring models

Avoiding Spiraling Effects on Helical Windings with Appropriate Dynamic Axial Short-Circuit-Force Calculation and Evaluation Methods

G. KOCZKA, G. LEBER
Siemens Energy Austria GmbH

ID: 11984
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Transformer Condition Assessment, Dissolved Gas Analysis (DGA), Classical Methods, Artificial Intelligence, Predictive Maintenance

Artificial Intelligence and Classical Methods in DGA Interpretation - Hybrid Approaches for Practical Transformer Condition Assessment

A. PIRKER[1], M. DARMANN[1], T. L. UDEH[2], F. BELAVIĆ[3]
[1]VUM Verfahren Umwelt Management GmbH; [2]Carinthia University of Applied Science; [3]Austrian Power Grid AG

ID: 11990
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Transformer - Diagnostics - Online Monitoring Usability - Bushings - Failure - Fire Risk - Mitigation

Power Transformers Operational Safety Improvements

M. LECHMAN[1], P. WARCZYŃSKI[2]
[1]Polskie Sieci Elektroenergetyczne S.A., Poland; [2]TRAFO-SERWIS, Poland

ID: 11991
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Dry-type power transformer, partial discharge, condition assessment, on-site testing

Systematic Approach for Condition Assessment of Dry-Type Transformers based on Partial Discharge Measurements

B. ENGSTLER[1], C. ENGELEN[1], A. HERRERA[1], P. WISCHTUKAT[2]
[1]OMICRON electronics GmbH; [2]Hubert Göbel GmbH

ID: 12048
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation

Optimization of reliability and safety in power transformers and reactors through advanced monitoring and data analytics

E. CANTOR[1], S. CARMONA[2], I. LOZADA[3]
[1]Intercolombia; [2]intercolombia; [3]Intercolombia

ID: 12056
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Dissolved Gas Analysis (DGA), Fault classification, Furanic compound analysis, Generator step-up unit transformer (GSUT), Thermal fault diagnosis

Case Study on Fault Detection in Generator Step-Up Unit Transformers of Mae Moh Coal-Fired Power Plant Unit 14 Using Dissolved Gas Analysis

J. LAOWANITWATTANA, A. KRITSADATAN, N. PROMSURIN
Electricity Generating Authority of Thailand (EGAT)

ID: 12093
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: VFTO, Shunt Reactor, GIS, Bushing

Evaluation on VFTO Phenomenon for Shunt Reactor and GIS Connected Transformer Bushing Applications

S. NANYAN[1], G. K. SUPRAMANIAM[1], H. KASIM[2]
[1]Tenaga Nasional Berhad, TNB; [2]TNB Labs Research

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A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation

Forensic Analysis on Alligatoring Cracking Phenomenon on Transformer Bushings Polymeric Insulators in Malaysian Power Utility Environment

G. K. SUPRAMANIAM, S. NANYAN
Tenaga Nasional Berhad, TNB

ID: 12318
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: A2 PS3 - Failure prevention, detection and investigation
Keywords: Silver corrosion, elemental sulphur, synthetic ester, power transformers, mitigation, treatment, S8 removal.

Synthetic ester silver corrosion testing and corrosive sulphur removal demonstrated on power transformer

J. LUKIC, J. JANKOVIC, D. KOLARSKI, V. IVANCEVIC
Nikola Tesla Institute, Serbia

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Methods for Direct and Indirect Condition Assessment of Insulating Paper in Transformers

T. MUENSTER[1], T. LAINCK[1], P. WERLE[2]
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Keywords: No-Load Loss Measurements, No-Load Conditions – Methodology, DGA, Diagnostic Application, Case Studies, FAT, Power Transformer Under Repair, On-Site No-Load Test, GSU Transformer.

DGA as a Diagnostic Tool During No-Load Tests

V. RADIN[1], B. DJURIC[1], D. JOVANOVIC[1], M. BRDAREVIC[2]
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S. TENBOHLEN[1], D. MARTIN[2], R. GÖTZ[3], F. BELAVIĆ[4]
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Keywords: Power transformer, IEC 60076-5, Short-circuit forces, Electromagnetic forces, Dynamic forces, Short-circuit failure, Helical shaped winding, Winding pitch, Core saturation.

Improved Reliability Through Advanced Short-Circuit Force Analysis in Transformer Windings: 3D magnetic field boundary conditions and dynamic effects

K. SETHI[1], M. MUÑOZ[2], J. FORSLIN[3], M. ULIANA[4]
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Keywords: current limitation, DC grid, power testing, protection, superconductivity

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C. CREUSOT, D. BRASILIANO, Y. ABDUL-SAMAD-EL-SKAFF, A. BERTINATO, N. DEVEAUX
SuperGrid Institute

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Jackson & Frank

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ELECTRIC AND THERMAL ANALYSIS OF 33kV DC VACUUM CIRCUIT BREAKERS USING 3D MODEL

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Keywords: Evaluation of Dielectric, Deterioration, Grading, Capacitor, diagnosis

Evaluation of Dielectric Deterioration of Grading Capacitor through supplementary diagnosis techniques

S. S H RAY*, P R S YADAV, R P S RANA, A. LAHIRI, B. LAKPATHI
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Keywords: Operational, experience, reactors, conventional, substation, Indian grid

Operational experience with current-limiting series reactors in conventional substation within the Indian grid

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POWERGRID , India

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Keywords: Installation of Current, 400kV, Transmission, substation

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POWERGRID CORPORATION OF INDIA LTD, India

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Keywords: Transmission, Distribution, T&D, flexibility, Resilience, Stability, Connectivity

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N. RAJ*, S. RAVAL
Adani Energy Solution Ltd, India

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Keywords: AIS- Air Insulated Switchyard, SS- Sub station, DAC-double arc chamber, CB-circuit breaker, PIR-Pre Insertion Resistance, ISO-Isolator or Disconnector, LBB-Local Breaker Backup protection, Yph- Y phase, Gnd-ground, mS - millisecond, DR- disturbance record

Failure of 800 KV Circuit Breaker due to Lightening

J K PRAJAPATI[1], J K GAVEL[2]
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Keywords: Metal-Oxide Surge Arrester (MOSA) - Zinc Oxide (ZnO) Arrester - Surge Arrester Selection - 765 kV EHV System - Insulation Coordination - Switching Overvoltage (SOV) - Temporary Overvoltage (TOV) - Substation Protection - Grid Resiliency

Surge Arrester Application in 765 kV Systems: Current Practices and Future Trends in the U.S. Transmission Grid

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Hitachi Energy, United States of America

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Keywords: Vacuum circuit breaker (VCB), hydro power plant, overvoltages, EMTP, surge arresters

Evaluation of high-voltage Vacuum Circuit Breaker installation: laboratory tests, simulations and on-site measurements

I. DIA, J. BOUVIER

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Topics: A3 PS1 - Transformation of T&D assets for evolving grid conditions
Keywords: Shunt Reactor Switching; transient recovery voltage;

Shunt Reactor Switching in Brazilian Grid: A Critical Analysis of Circuit-Breaker Standard Requirements and the Actual Stresses in the Network

A. C. CARVALHO
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Keywords: High voltage, DC, Circuit breaker, Residual Current, Testing

Development of an HVDC Circuit-Breaker and the Study of Testing Methods

T. INAGAKI[1], T. AKAHOSHI[1], R. MANOHAR[1], S. NEE[2], T. MODEER[2], S. NORRGA[2]
[1]Mitsubishi Electric Corporation Japan; [2]Scibreak AB Sweden Sweden

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Optimum Fault Current Limiter Placement And Its Parameter Calculation

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Failure of Vacuum Interrupter due to unequal flux linkages in master circuit breaker used for short circuit testing – A case study

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Central Power Research Institute, INDIA

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Topics: A3 PS1 - Transformation of T&D assets for evolving grid conditions
Keywords: Corrosion, Corrosion Protection, Gas Insulated Switchgear, Air Insulated Switchgear, Salt-Spray Testing, Non-Destructive Testing, Corrosion Mapping

Corrosion in Gas-Insulated Switchgear and Circuit Breakers with Respect to Gas Leakage: Causes, Prevention, Lifecycle Impact, Field Experience, Laboratory Studies, and Recommendations

T. WANKHEDE[1], M. BARNETT[1], A. JONES[1], R. SLAUGHTER[1], G. WAKTARE[1], M. KITCHEN[2], D. ARMIT[3], G. SAFIAN[1], S. MANN[1]
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Application of controlled switching to (re-)energization of transmission lines in dynamically changing grid conditions

U. PARKH
Hitachi Energy

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Topics: A3 PS1 - Transformation of T&D assets for evolving grid conditions
Keywords: Fault Current Limiter, High-Voltage Power System, Grid Expansion, Protection

Application and Optimization of Fast Fault Current Limiters in Regional Grid Expansion

S. ZHONG, L. NIU, T. WANG
NR Electric Co., Ltd.

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Topics: A3 PS1 - Transformation of T&D assets for evolving grid conditions
Keywords: On-site calibration, Current transformer, Current modulation, Ratio error, Phase error

On-site Calibration Technology of Current Transformer Based on Background Current Modulation

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China Electric Power Research Institute

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Topics: A3 PS1 - Transformation of T&D assets for evolving grid conditions
Keywords: Disconnecting circuit-breaker, operational experience, switchgear configuration, major failure MaF, minor failure MiF, availability, reliability, disconnectors

Twenty-five years using Disconnecting Circuit Breakers: Return of operational experiences from Nordic European utilities

A. SANDOVAL
Svenska kraftnät

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Topics: A3 PS1 - Transformation of T&D assets for evolving grid conditions
Keywords: Vacuum Circuit-Breaker, Field Tests, Transformer Inrush, Switching Transient

Investigations of Switching Tests during Transformer Inrush with a 145-kV Vacuum Circuit Breaker

M. H. BRESTAN[1], P. HACKL[1], L. SCHWALT[2], F. BELAVIĆ[2], J. WEISKAR[3], R. SCHAEFER[3], R. SCHUERHUBER[1]
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Topics: A3 PS1 - Transformation of T&D assets for evolving grid conditions
Keywords: low-power instrument transformer, power quality, SFRA, frequency response analysis, test voltage level

On-site SFRA at MV LPVTs and VTs for Metering Application - Investigation of Test Voltage Dependency

T. BISCHOF[1], F. FEUSTEL[1], R. SCHULZE[1], E. SPERLING[1], L. CESKY[2], B. SEVCIK[2]
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Topics: A3 PS1 - Transformation of T&D assets for evolving grid conditions
Keywords: Gas-Insulated Switchgear (GIS), SF_6 Diagnostics, Reliability Analysis, Circuit Breaker Lifetime, Condition-Based Maintenance

Failure Investigation of Gas-Insulated Switchgear at 110-500 kV Substation, Maintenance and Repair

A. EPIFANOV, A. KHRENNIKOV*, I. GALIASKAROV
S&T Centre of Rosseti FGC UES

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Impact Of Digital Substations On The Specification And Connection Of Instrument Transformers

J. D. PALENCIA[1], J. TORO[2], J. SANCHEZ[3]
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Operational Excellence Applied To High-Voltage Circuit Breaker Failures At ISA INTERCOLOMBIA

C. URREA AGUIRRE[1], A. RUA MONCADA[2], A. CASTRO LOPEZ[3]
[1]Intercolombia; [2]intercolombia; [3]ISA

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Topics: A3 PS1 - Transformation of T&D assets for evolving grid conditions
Keywords: High voltage circuit breaker, SF6 alternatives, dielectrics, rise of dielectric withstand, controlled switching

Characterization of controlled Switching of SF6 free 420 kV Live Tank Circuit-Breaker

R. KARRER[1], T. ROININEN[2], V. PATEL[2], M. DHOTRE[1], B. RADISAVLJEVIC[1], U. PARIKH[2], M. STOECKLI[3]
[1]Hitachi Energy Switzerland; [2]Hitachi Energy Sweden; [3]ELECTROSUISSE / CIGRE Switzerland NC Secretary

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Topics: A3 PS1 - Transformation of T&D assets for evolving grid conditions
Keywords: Gas Insulated Line, Pressurized Air Cable, High Voltage, SF6 free, shaped conductor, high current busbar, GIL, GIB

3-phase encapsulated Pressurized Air Cables for 420 kV: Design, Optimization and Application

W. HOLAUS[1], Z. TANASIC[1], E. EMELIYANOV[1], E. MULLER[1], J. SMAJIC[2], M. STOECKLI[3]
[1]HIVODUCT Switzerland; [2]ETH Zurich Switzerland; [3]ELECTROSUISSE / CIGRE Switzerland NC Secretary

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Topics: A3 PS1 - Transformation of T&D assets for evolving grid conditions
Keywords: SF6-free, vacuum circuit breaker, shunt reactor switching, capacitive current switching, single capacitor bank, back-to-back, RC-filter circuit

Switching of Reactive Loads with High Voltage Vacuum Circuit Breaker

R. CERNAT, S. GIERE, T. HEINZ, J. TEICHMANN, J. WEISKER, P. WEHLAN, S. WETHEKAM
Siemens Energy Global GmbH&Co KG Germany

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Quantifying the Impact of Automated Reclosers on Supply Continuity in Irish MV (Medium-Voltage) Networks

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Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: 420 kV, LT, CO2/O2, Decarbonization, Double break, EU LIFE program, HVCB, LCA, Outdoor application, SF6 alternatives, ADEME FRANCE 2030, very low temperature.

Live tank CO2/02 range update from 72 kV up to 420 kV

D. BERARD, M. BORREL, T. PISSARGIBOLLET, A. BOBEAU
GE Vernova

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Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: Gas Insulated switchgear, Metal enclosed, SF6-free, 245 kV, 420 kV, Circuit breaker, GIS Bay, C4FN / O2 / CO2

Update on C4FN mixture 245 kV and 420 kV metal enclosed switchgear

C. GREGOIRE, A. PERRET, C. HUGUENIN, J.-B. JOURJON
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Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: LCA, Aluminium, Recycling, Carbon-footprint, GIS

Use of recycled aluminium: challenges for metal enclosed parts in switchgears

S. LAURENT[1], C. DUMOULIN[1], E. MANGE[1], M. PERRET[1], L. TREIER[1], M. KWIECIEN[2], H. PUTO[2]
[1]GE Vernova; [2]Thoni Alutec

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Keywords: LPIT, GIS, Digital Substation, Compactness, Lightweight

Key lessons from long-term LPIT experimentation to support digital and environmental transition

L.-D. ROUX[1], J.-L. RAYON[2], J.-F. MIRONNEAU[2]
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Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: SF6, greenhouse gas, electrical industry, alternative technology, climate change mitigation, GIS, GIL, existing assets, high voltage

Retrofill application of 420 kV Gas Insulated lines with fluoronitrile based gas mixture

S. FIFI, H. DOLIGEZ, C. CABRERA, K. SCHANG, E. GROB

GE Vernova

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Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: Retrofit - Conversion - Sustainability - Life Extension - Standards

Power Switchgear Retrofitting: Lessons from ANSI Standards Built on Four Decades of American Experience

J. WEBB[1], D. MONTORFARNO[2]
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Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: Sensor, Integration, Process Bus, Efficiency, Reliability, Data, Communication

Revolutionizing Power Grid Modernization : The Impact of LPIT and Sensor Integration via Process Bus on Efficiency, Reliability, and Data Communication

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Asset management strategies including optimised maintenance, SF6 transitions and improve resiliency & ISO 55001 implementation journey

R. S. CHAUDHARY*, D. PAUL, M. KALORIA, D. N. JHA, R. SRIVASTAVA
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Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: Dry Air, Residual Current, Switch, Insulation, Firefly, Partial Discharge, Superimposed Impulse Voltage, Test

Dielectric Properties of highly - pressurized Dry Air and their Application to 550 kV DC Residual Current Switch

M. MIYASHITA, S. SASAKI, T. ASHIKAGA, Y. SAKATA, K. MATSUYAMA, T. INAGAKI
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Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: Synthetic Air, Bus Transfer Current, Electromagnetically Induced Current, Switching

Evaluation of Current Switching Performance with Synthetic-Air Disconnector and Earthing Switch

T. ONISHI[1], N. IWANADE[1], T. KOIKE[1], A. MUKAIDA[1], T. OZEKI[2], K. IWAHARA[2]
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Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: Extra High Voltage (EHV), Gas Insulated Switchgear (GIS), SF6 Alternative, Natural-Origin Gas, CO2/O2 Gas Mixture, Gas Insulated Bus (GIB), Metal Oxide Surge Arrester (MOSA), Circuit Breaker (CB), Breakdown

Development of SF6-Free EHV Gas-Insulated Switchgear Employing a CO2/O2 Natural-Origin Gas Mixture

Y. SHO, T. SUSUKI, K. KUBO, T. MATSUMOTO, T. KOIKE, T. IIJIMA, A. MUKAIDA
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Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: Dry Air, Insulation, Synthetic Air, Clean Air, SF6, Vacuum Circuit Breaker, Gas Handling, GWP

Dry Air-insulated 245 kV Dead-Tank Vacuum Circuit-Breaker - Insulation Design and its Verification

D. YAMADA[1], S. ISHITANI[1], M. SATO[1], H. HAMA[1], A. POETZSCH[2], T. HEINZ[2], K. JUHRE[2], D. CORTESE[3], K. MIANZO[3]
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Decarbonization of Power Systems - Green Equipments (SF_6 Free)

P. PANDEY*, H. MITTAL, S. JAIN, A. K. SINGH
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Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: Condition-based Maintenance, Condition Monitoring, Digital Substation, IEC 61850, LPIT, Merging Unit, MMS, Optical Current Transformers

Reliable Power Grid Operation with Self-Monitoring Optical Current Transformers

C. DUTRA[1], L. TOMINAGA[1], J. OLIVEIRA[1], T. MATSUO[2], S. ZIMATH[2], V. WOYAKEWICZ[2], M. OLIVEIRA[3], R. LIMA[3], L. FREITAS[3]
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Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: pressurized tank, mechanical stress, GIS

Mechanical Stresses in GIS Grid components

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SF6 free RC Divider for DC Measurement on AIS HVDC Systems

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Sizing Vacuum Generator Circuit Breaker with Modern and User-Friendly EMT Model - Field Experience Applications

L. CASADO FULGUEIRAS[1], K. GREBENNIKOV[2], P. LA SETA[2], H. URBANEK[2]
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Testing of Biodegradable Fluids in High Voltage Current Transformers

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Breakthrough for Rogowski coils (LPCTs) in medium voltage switchgear: benefits, standardization, and challenges in protection and testing applications

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Megger Sweden

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Technology innovation of VI(Vacuum Interrupter) and challenges for the Eco-friendly power equipment industry in Korea

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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: C4-FN mixtures, circuit breakers, CO_2/O_2/C4-FN, DTB, eco gas mixture, GIS, high voltage, SF6-free, switchgear, pre-insertion resistor

Development of 550 kV SF6-free Circuit Breaker for Dead Tank Breaker and Gas-Insulated Switchgear

F. KONG, X. LIU, Y. YANG, M. ZHENG, V. TEPPATI, C. YANG, S. KOTILAINEN, R. VOSS, M. BUJOTZEK
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: Curbing the global warming trend, 550kVcurrent transformers, Air insulation properties, Improve the insulation strength, Installable and operable with security features

Developmentand Maintenanceof 550kVUHV Clean Air CT

F. XUE, K. ZHAO, H. ZHANG, Y. LV
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: VIs, AMF, NSGA-II, GABP, 1/2 turn coil contact

Design optimization of a 1/2-coil type contact based on NSGA-Ⅱ optimization algorithm and GABP neural network optimal

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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: CO2/O2/C4-FN mixture, thermal interruption, dielectric strength recovery, SF6 alternative, HVCB

Study on Thermal Interruption and Dielectric Recovery Performance of CO2/O2/C4-FN Mixture in HVCB

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A flash method for recycling insulator core rods into silicon carbide

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Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: SF6-free, C4F7N/CO2, circuit breaker, CFD, dielectric recovery, current interruption

Gas Blast of C4F7N/CO2 Circuit Breaker under Various Current Levels

W. GU, X. WANG, Y. LI, W. SANG
Sieyuan Electric Co., Ltd.

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Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: High Voltage Circuit Breaker, Correct Maintenance, Test Graphic, Dynamic Contact Resistance(DRM)

Troubleshooting HV Circuit Breaker Problems in the Field with Advanced Testing Techniques

E. KILIÇ, A. H. SERT, F. TAŞDEMİR AYDIN, Y. BİLGE, B. N. TOKER
Turkish Electricity Transmission Corporation

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Application of PMVE Mixture in 145kV Gas Circuit Breaker

Y. H. OH, H. J. JANG, K. D. SONG
KERI

ID: 11829
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS2 - Sustainability and circular economy of T&D equipment

Keywords: .420 kV, GIS, SF_6-free, Dry-type cable termination, Interface testing, Standardization, Substation design, 420 kV, XLPE cable, Dry type technology, SF6 reduction, C4-FN, Fluoronitrile, Connection system, Qualification tests.

420kV SF6-free GIS Substation Design, pioneering in new SF6-free Dry type Cable technology interface testing method standardization, implementation and recommendation for substation design

G. BLANCHET[1], J. MATALLANA[1], P. BOFFI[2], A. FERTI[2], J. A. BREIMO[1], A. FICHEUX[3]
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: SF6-free, switchgear, High-voltage AC and DC grids, HVAC, Vacuum circuit breaker, Partial discharge detection, Pilot installations, Offshore HVDC system, MVDC ultrafast circuit breaker, EU F-gas regulation

SF6-free switchgear for the future resilient European grid

A. PEDERSEN[1], N. STØA-AANONSEN[1], M. GAMMELSÆTER[1], L. AMARAL[2], M. LESSER[3], M. NGUYEN[4], G. BLANCHET[5], M. MAGLIO[6], V. BERGMANN[3], R. MARSKAR[1], T. TREIDER[1], I. B. SPERSTAD[1]
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: LPIT, SPACER, GIS, Reliability, Sustainability

A Study on the Long-term Reliability of Spacer Type Low Power Instrument Transformers

J.-K. KIM, J.-G. LEE, J.-H. KIM, D.-H. JEONG
HYOSUNG

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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: SF6-free GIS

The Development of a SF6-free high voltage 170kV 50kA GIS including Environment test

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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: Sustainability, Transmission, AIS, SF6-free, F-gas-free, Vacuum, GHG emission

Emission-free 245 kV and 420 kV life-tank vacuum circuit-breaker

M. KUSCHEL, L. BINNER, J. TEICHMANN, T. HEINZ, P. GRONBACH, M. LESSER, R.-M. CERNAT, M. ROLF
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: Circuit breaker, Gas-insulated switchgear (GIS), Greenhouse gas (GHG) emissions, Maintenance, Explosion of SF6 circuit breaker, Alternative gas

Experiences from the Exploitation of High-Voltage SF6 Circuit Breakers and SF6 Gas-Insulated Switchgear (GIS) in the Power Utilities of Croatia and Serbia

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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: High-Voltage Switchgear, SF6-free, Type Testing, Short-Circuit Testing

Type Testing of SF6-Free High-Voltage Switchgear at Highest Ratings - Key Experiences and Technical Aspects

D. BAECKER[1], G. HOFFMANN[1], M. HEDDERGOTT[1], J. KIEFER[1], M. STOECKLI[2]
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ID: 12248
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: HVCB, High-Voltage Circuit Breaker, C4F7N, extended electrical endurance, shunt reactor switching, back-to-back, transient recovery voltage, TVR, inductive load switching, inrush current and frequency

Back-to-back switching, inductive switching and extended electrical endurance E2 performance of a CO2+C4F7N-based 145kV HVCB

M. GOTTI[1], J. MANTILLA[1], X. YE[1], J. KIM[2], S. KIM[2], S. KIM[2], M. STOECKLI[3]
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: power quality metering, low-power instrument transformer, LPIT, standardization, IEC 61869

Low-power intstrument transformers for power quality metering

X. GU[1], Z. GALIC[1], H.-D. SCHLEMPER[1], M. STOECKLI[2]
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ID: 12250
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: High Voltage Circuit-Breaker, SF6 alternatives, puffer technology, computational fluid dynamic simulation, dielectrics, short line fault, terminal fault

Development and Testing of the World's first 420 kV SF6 free Live Tank Circuit-Breaker

R. KARRER[1], T. ROININEN[2], V. PATEL[2], M. DHOTRE[1], B. RADISLAVLJEVIC[1], M. STOECKLI[3]
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: bio-based, bushing, epoxy, high-voltage, insulation

Bio-based Epoxy Resin for High-Voltage Bushings: Insight into more sustainable Materials with improved Insulation Performance

V. LUTZ[1], Z. LUO[1], E. FERDJALLAH[1], M. STOECKLI[2]
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ID: 12252
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: gas insulated switchgear, live tank circuit breaker, puffer technology, SF6 alternatives, short circuit current, transmission grid

420 kV SF6-free Live Tank Circuit Breakers and Gas-Insulated Switchgear for 80 kA Applications

M. PALAZZO[1], D. TEHLAR[1], M. BUJOTZEK[1], K. CHAUHAN[2], M. REFAEY[1], T. RODLER[3], M. TUCZEK[3], M. STOECKLI[4]
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: data analysis, decarbonization, energy transition, fluoronitriles, gas insulated switchgear, HVCB, machine learning, neuronal networks, SF6-free, simulation, testing

Application of Machine Learning Models to the Development of SF6-free High Voltage Gas Insulated Switchgear

K. PANDYA[1], H. SOHN[2], A. REYES[1], M. GOTTI[1], J. KIM[2], J. MANTILLA[1], M. STOECKLI[3]
[1]HD Hyundai Electric Switzerland; [2]HD Hyundai Electric South Korea; [3]ELECTROSUISSE / CIGRE Switzerland NC Secretary

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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: GIS, C4-FN mixtures, long-term return of experience, site measurements, gas quality

Return on Experience on the C4-FN/O2/CO2 Technology based on a GIS after 7 years in Operation

M. PERRET[1], M. INVERSIN[2], M. LACUVE[3], D. LEGUIZAMON-CABRA[3], M. STOECKLI[4]
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: HVCB, SF6-free, SF6 alternatives, CO2/O2/C4-FN, C4-fluoronitrile, sub-transmission, type testing

Type-testing of a new metal-enclosed 145 kV CO2/O2/C4-FN Circuit Breaker with a cross-platform Design

P. STOLLER[1], B. SPREEN[1], M. NUREDINI[1], R. KARRER[1], F. LUNDQVIST[1], M. STOECKLI[2]
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: C4F7N, double-chamber, HVCB, high voltage circuit breakers, grading capacitors

Development Experience of C4F7N-based 420 kV HVCB, double chamber and single chamber Prospects

T. SUTHERLAND[1], M. GOTTI[1], K. PANDYA[1], J. MANTILLA[1], M. STOECKLI[2]
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: C4-FN mixtures, circuit breaker, current interruption, dielectric optimization, dielectric tests, eco gas mixture, high voltage, SF6 alternatives, SF6-free, short line fault, terminal fault, voltage withstand

Advanced optimisation Techniques for eco-efficient Circuit Breaker Design - Applications to a newly developed 245 / 300 kV SF6-free High Voltage Circuit Breaker

V. TEPPATI[1], W. THUNBERG[1], Y. LU[1], P. FREI[1], S. KOTILAINEN[1], M. STOECKLI[2]
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: C4-FN mixture, circuit breaker, controlled closing, current interruption, dielectric, dead-tank breaker, gas insulated switchgear, high voltage, SF6 alternatives, SF6-free, short line fault, shunt reactor switching, terminal fault, voltage withstand

Developing and standard testing of a 245 kV / 300 kV eco-efficient High-Voltage Circuit Breaker and Switchgear

V. TEPPATI[1], F. COSTANTINO[1], M. NUREDINI[1], P. FREI[1], M. DHOTRE[1], V. TILLIETTE[1], M. STOECKLI[2]
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Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: HVCB, High-Voltage Circuit Breaker, C4F7N, CFD, machine learning, MOO, dielectric recovery, thermal interruption, neuronal networks, pareto front

Machine learning-driven Component optimization for eco-friendly High-Voltage Circuit Breaker design

X. YE[1], S. BRYNDA[1], O. COSSALTER[1], M. GOTTI[1], J. MANTILLA[1], M. STOECKLI[2]
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Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: Sustainability, Transmission, Circuit-Breaker, AIS, SF6-free, F-gas-free, Vacuum, GHG emission, Clean Air, Non-linear resistor, 420 kV

Analysis of behaviour of an emission-free 420 kV live-tank vacuum circuit-breaker

R.-M. CERNAT[1], S. WETHEKRAM[1], L. BINNER[1], M. LESSER[1], P. WERDELMANN[2], D. ALFES[2], S. HANS[2], D. E.[2]
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: Low-power instrument transformers (LPITs); Medium Voltage Gas-insulated Switchgear (MV GIS); Life Cycle Assessment (LCA); CO_2 emissions; IEC 61850; Sampled Measured Values (SMV); Process Bus; accuracy class 0.2(S); MID-certified revenue metering; medium-v

Impact of Low Power Instrument Transformers on Medium Voltage Gas Insulated Switchgear Sustainability

T. BAJANEK, V. PROKOP, L. CESKY, R. PERNICA, N. VYBIRALOVA, P. VANO
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: SMART MV SWITCHGEAR, LOW POWER INSTRUMENT TRANSFORMERS, MV SENSORS, IEC 61850 COMMUNICATION, OPERATION EFFICIENCY, SUSTAINABLE POWER DISTRIBUTION, REVENUE METERING, BUSBAR DIFFERENTIAL PROTECTION

A Decade of Smart Medium Voltage Switchgear: LPITs and IEC 61850 Advancements

K. MAJER, V. PROKOP, M. CELKO
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS2 - Sustainability and circular economy of T&D equipment
Keywords: Vacuum Interrupter, Vacuum Circuit Breaker, Low Frequency, AMF, TMF, Butt Contacts

Vacuum Current Interruption for Low Frequency Applications

D. GENTSCH[1], S. GORTSCHAKOW[2], A. LAWALL[3], F. GRASKOWSKI[3], N. DORRAKI[3]
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Environmental friendly high voltage testing equipment with synthetic air

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A3 PS3 - Asset management strategies for T&D equipment

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Keywords: Seismic Design - High Voltage Equipment - Artificial Intelligence (AI) - Digital Twin Technology - Instrument Transformer - Circuit Breaker

Seismic Design of High Voltage Equipment through AI-Driven Engineering

F. LIMA[1], A. VIEIRA[2], L. GALVAO[2], C. KADASIDDA[3]
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Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: Robotic, Automation, Transmission, O&M

Robotic Process Automation for Transmission O&M

R. SAHU*, R. KOPEWAR, S. MALI, M. SHINDE
Tata Power Co. Ltd, India

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Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: Assessment, Healthiness, EHV, Lightning, Arrestors

Novel Method of Assessment of Healthiness of EHV Lightning Arrestors using Total Harmonic Distortion analysis of Leakage Current

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Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: Interrupter, Replacement, 765 kV, Circuit, Breaker

Minimizing Grid Downtime Through On-Site Interrupter Replacement of 765 kV Circuit Breaker at Ballia Pooling Station

A. KUMAR*, T P VERMA, P. SHARMA, Y. K. DIXIT
Power Grid Corporation of India Ltd ,India

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Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: Current, Transformer, Health, Assessment, Condition Monitoring

Development of a Real-Time Online Condition Monitoring System using Tan delta leakage current for Current Transformer Health Assessment

V. PARGANIHA*, R. VUSALA, R. P. SINGH, V. C. MEHATA
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Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: Digital, Twin, Predictive, Asset, Management, Distribution, Grids

Digital Twin and Predictive Asset Management for Distribution Grids in Delhi: A BRPL Case Study

A. KUMAR*, A. NAGARAJAN, S. WADHERA, S. KHETARPAUL, A. RANJAN
BSES Rajdhani Power Limited , India

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Keywords: switchgear, monitoring

MV Switchgear monitoring & analysis using Panel Health Monitoring System

S. JOSHI*, V. BHOSALE, A. BHUTKAR, A. CHAUHAN
TATA power Co. Ltd, India

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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: Challenges, AIS, GIS, Substation, Transformation

Future-Ready T&D Assets: Overcoming Challenges in AIS and GIS Substation Transformation

B. SINGH*, S. KUMAR, S. KUMAR, L. SARKAR
BHEL, India

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Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: Installation, Commissioning, Operation

From Dormancy to Operation: Successful Restoration, Installation and Commissioning of a 420kV Gas Insulated Switchgear (GIS) After Prolonged and Adverse Storage

M G GOKHALE*, S ADHIKARI, I P RANJAN, M. SRIVASTAVA, N. K. SINGH, A TIWARY, J. K, R. KUMAR
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ID: 10328
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Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: 400 kV, GIS, SF_6, restoration, strategy

Case Study on Flashover in a 400 kV GIS Compartment due to undetected SF_6 pressure drop and restoration strategy

P. SHARMA*[1], B. B. NANDA[1], R. R. TRIPATHI[2], R. SHANKAR[3]
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: Conceptualization, development, Asset, Performance, Management

Conceptualization & development of unified Asset Performance Management (APM) framework in POWERGRID.

M. K. KALORIA*, D. N. JHA, D. PAUL, R. SRIVASTAVA, N. SRIVASTAVA
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: Implementation of SF_6 Online Monitoring, HV Circuit Breakers

Innovative Implementation of SF_6 Online Monitoring for HV Circuit Breakers

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Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: Life Assessment, MTS, Gas Circuit Breaker, Grease, Oil Content, Deterioration, Silver Plating, Wear, Rotary Sliding, Sliding Limit

Criteria for renovating Circuit-Breakers of 500 kV MTS

K. SASAMORI[1], M. SATO[1], N. IGURA[1], A. HATSUZAKI[2], Y. YAMAMOTO[2], A. SUGAWARA[2]
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Topics: A3 PS3 - Asset management strategies for T&D equipment

A Data-Driven Paradigm: Digital Twins, IoT and AI for Predictive Management of High-Voltage T&D Assets

A. MAYANK*, B. ANAND, S. K. GUPTA, D. Y. DWIVEDI
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ID: 10817
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: Industrial Internet of Things (IIoT), Substation Asset Monitoring, Predictive Maintenance, Thermal Imaging, SF_6 Monitoring, Reliability-Centered Maintenance (RCM), Smart Sensors, Digital Substation, Asset Health Index, Real-Time Monitoring, Cybersecurity

Integeration of smart IIoT sensors in T&D for enhanced monitoring

R. S. CHAUDHARY*, D. PAUL, A. DUBEY, R. SRIVASTAVA, J. G. JOSE
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Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: series capacitor, smart sensor, energy harvesting, artificial intelligence, diagnostics, maintenance prescription

Research and Application of Innovative Smart Sensors and AI-based Diagnostic, Prognostic and Prescription Software for Series Capacitors

M. ALVES[1], M. SANTOS[2], C. CHANGWEI[2], W. FERREIRA[2], J. B. SILVA[3], R. SANTOS[3], R. ANDRADE[3], F. HÖPKER[4], J. SILVA[4], J. DUQUE[4], D. PEDROSA[1], M. PINTO[1], C. HARISSIS[1], A. CABRINO[1], G. MOURA[1], D. PIVOTO[1], C. PEDROSA[1], H. SANTOS[1], B. SARDINHA[1], D. MENDES[1]
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: Asset Management, Finite Volume Method, Infrared Thermography, Multiphysic Simulation, Predictive Maintenance, Surge Arrester

Electro-Thermal Modeling of ZnO Surge Arresters for Predictive Maintenance Support through Infrared Thermography Considering Porcelain and Polymeric Housings

J. LIMA MATTJE[1], M. A. CAETANO DOS SANTOS[2], R. GRAEFF[3], P. RASCHKE[4]
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: frequent-operation circuit breakers, on-line monitoring, signal processing, artificial intelligence, diagnostics, Intelligent Electronic Device

Research and Development of an On-line Monitoring System for Circuit Breakers under Frequent-Operation Regime

M. ALVES[1], L. SOUZA[2], B. REIS[2], F. PIOTO[2], D. PEDROSA[1], M. PINTO[1], C. HARISSIS[1], A. CABRINO[1], G. MOURA[1], B. SARDINHA[1], I. MODA[1], D. PIVOTO[1], C. PEDROSA[1], H. SANTOS[1], R. FERREIRA[1], D. MENDES[1]
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: Asset Management - Natural Language Processing - Underground Transmission

Applying Natural Language Processing and Machine Learning to Support Underground Transmission Asset Management by Analysis of Maintenance Records

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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: PQ; SAMU; IT

Towards Intelligent Digital Substations: SAMU-NG with Digital Twin for Inductive Instrument Transformer Compensation

D. PALLADINI
RSE

ID: 11155
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: Frequency domain, frequency response analysis, perturbation signals, time domain, voltage measurement systems, wideband classes

Evaluation and characterisation of test signals in the time and frequency domain for the frequency response analysis of voltage measurement systems

F. MWANIKI[1], J. BEKKER[1], E. SPERLING[2], R. SCHULZE[2], J. VERMEULEN[1]
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Keywords: Digitally enabled substation service: a structured framework to establish a collaborative asset management environment. The ERG use case in wind power generation

Digitally enabled substation service: a structured framework to establish a collaborative asset management environment. The ERG use case in wind power generation

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Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: Asset management, Condition-based maintenance, Damped AC, Distribution networks, IEC 60270, IEEE 400, Insulation diagnostics, Medium-voltage cables, Partial discharge, Predictive maintenance, Utility networks

Enhancing Predictive Maintenance of 11kV Distribution Networks-offline Partial Discharge Testing Using Damped AC Signals

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Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: Version control, Shell scripting, Automation, Circuit breaker maintenance test record

Applying IT Version Control to Circuit Breaker Maintenance Test Records

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Keywords: Asset Monitoring – Dashboard – User Journey – Key Learnings – SF6 – Data – Sustainability Reporting – Trend

Beyond Go-Live: Key learnings from the data journey of dashboard solutions for enhanced SF6 monitoring

K. LEE, K. S. OFTEBRO, G. BLANCHET
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Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: optimization of maintenance strategy, switching equipment, substation, machine learning model, condition-based maintenance, asset health index, explainable AI

A methodology for real-time health monitoring and management optimization of Substation switching equipment using interpretable machine learning

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Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: Circuit Breaker Monitoring, Condition Monitoring, Machine Learning Applications, Phase De-tection, Solenoid Action

Data-Driven Condition Monitoring of AC-supplied Trip Coils of Circuit Breakers

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Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: Current Transformer, Control-Oriented Modelling, Model Identification, Ferromagnetic -Core Material, Jiles-Atherton Model

Parameter Identification and Application Guide of a Computational Efficient Control-Oriented Ferromagnetic Transformer Core Model

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Predictive Diagnostic Model with Artificial Intelligence for High-Voltage Switchgear Failures

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Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: Insulators, Flashover events, Leakage Current, Contamination

Effect of Form factor, Non-Uniform Contamination, and UV Radiation on Leakage Current in High-Voltage Insulators

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Intelligent Failure Prediction System: Transforming Traditional Maintenance Strategy through Advanced Predictive Analytics and Organizational Change Management

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Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: SF6 Leak Detection, Gas-Insulated Substations, Predictive Maintenance, Sensor Technology, Machine Learning Models

Predictive Monitoring of SF6 Gas Leaks in GIS Substations Using Sensor Technology and Machine Learning Models

A. HUAMAN, P. CASABONA, A. GIBU, J. DAVILA
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Topics: A3 PS3 - Asset management strategies for T&D equipment

Development of a Digitalized Circuit Breaker Continuous Online Monitoring System and Intelligent Dashboard for Smart Asset Management

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From Silo to Synergy: Achieving Interoperability in Asset Performance Management

E. AUMANN[1], J. SKIERSZKAN[1], B. FISCHER[2], L. LINK[2]
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Efficient Condition Assessment System for Circuit Breaker Fleets addressing both Reliability and Sustainability

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Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: High-voltage circuit breaker, Digitalization, Vibro-acoustic, Condition Assessment

Benefits of a vibro-acoustics-enhanced method for assessing the condition of high-voltage circuit breakers

A. KURZ[1], J. KRELING[3], P. MASMEIER[1], M. KOCH[2], R. GÖTZ[3]
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Online monitoring and state-of-health estimation of circuit breakers using data analysis and AI

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A recommendation for T&D industry on how to digitalize the Value Chain

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Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: Floating DC Battery Systems, DC Battery Grounds, Monitoring, Critical Ground Resistance Values

Advanced DC Battery Ground Monitoring

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Topics: A3 PS3 - Asset management strategies for T&D equipment
Keywords: Artificial Intelligence, Asset Management, Defect Detection, Distribution Inspection

Enhancing Power Distribution Defect Identification with Video- Based Computer Vision: A Two-Step Defect Detection Method

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