

2013 INMR World Congress

**Insulators, Arresters, Bushings,
Cable Accessories**

**Vancouver, British Columbia, Canada
8-11 September 2013**

Volume 1 of 3

ISBN: 978-1-63266-035-0

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2013) by Insulator News & Market Report (INMR)
All rights reserved.

Printed by Curran Associates, Inc. (2014)

For permission requests, please contact Insulator News & Market Report (INMR)
at the address below.

INMR
P.O. Box 95 Westmount (Montreal), Quebec
Canada H3Z 2T1

Phone: (514) 939-9540
Fax: (514) 939-6151

info@inmr.com

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

VOLUME 1

High Voltage Braced Insulator Assemblies Strength Requirements	1
<i>Anthony C. Baker</i>	
Arrestors - Live Insurance of the Grid	17
<i>Herbert Klausner</i>	
ALSTOM Grid Bushings	36
<i>Johan Bindele</i>	
Thermography Surveys Detects Insulator Anomalies	50
<i>Derrick Brydges</i>	
Design and Testing of a 225-kV Externally Gapped Line Arrester for Installation Under Live Conditions	80
<i>Plamen Bunov, Lars Klingbeil, Bastian Gobler, Cristian Pietsch</i>	
Designing the Future Power Lines	96
<i>Erik Bystrup, Henrik Skouboe, Brian Endahl</i>	
Retrospect to Prospect	125
<i>A. J. Carreira</i>	
Challenge of Converting Arrester Standards to Understandable Utility Standards	144
<i>Michael K. Champagne</i>	
Selection of Transmission & Distribution Insulators with Respect to Icing: IEEE P1820™	175
<i>William A. Chisholm, Masoud Farzaneh</i>	
Adapting Satellite Measurements of Air Pollution to Select Insulators	208
<i>William A. Chisholm</i>	
Testing of Clean Live-Line Tool Flashovers under Freezing Conditions	245
<i>William A. Chisholm, David Swatek</i>	
Aspects that Need to be Considered for the Calibration of Ultra Violet Solar-Blind Cameras Used for Electrical Inspection	273
<i>C. J. Coetzer, H. J. Vermeulen, B. M. Herbst</i>	
Considerations in Arrester Condition Monitoring (With Focus 3rd Harmonic Analysis of Current)	302
<i>Mike Comber</i>	
Automated Design Testing Procedures Using Software Simulation Tools	340
<i>Doug Craigen</i>	
Research on Electrical Performance of Icicle and Its Impact on Ice Flashover Due to Morphology Difference	360
<i>Yu Deng</i>	
Evolution of Cable Accessories in Heatshrink Technology	394
<i>Frank Drumm</i>	
Improved Methods for the Production of Silicone Shed Insulators	415
<i>Scott Early</i>	
Developments in Stress Control Systems in HV Cable Accessories	442
<i>Alexander Eigner, Robert Strobl</i>	
New CIGRÉ Principles for DC Insulation Selection	471
<i>Christiaan S. Engelbrecht</i>	
Service Experience with Composite Line Insulators: EPRI Perspective	496
<i>Andrew J. Phillips, Christiaan S. Engelbrecht</i>	
Advantages of Dry Type Cable Terminations up to 170 kV	514
<i>Matthias Freilinger, Filippo Bionda, Frank Brodbeck</i>	
Diffusion of Liquids into Silicone Rubber Materials	541
<i>Xidong Liang, Yanfeng Gao, Jiafu Wang, Zhipeng Yan</i>	
Bushing Standards and Influence on Design	564
<i>John Graham</i>	
The Analysis and Prospect of Outdoor Insulation of High Voltage Transmission Lines in China	583
<i>Zhicheng Guan, Xingming Wang, Zhidong Jia</i>	
Long-Term Service Experience of Apparatus Insulators Made of Silicone Rubber	622
<i>I. Gutman, Christian Ahlholm, Anders Holmberg, Dong Wu, Ulf Akesson, Lars Jonsson</i>	
New Approach for Assessing Pollution Performance of Composite Insulators	647
<i>Igor Gutman, Andreas Dernfalk</i>	
Effects of Volcanic Ash on HV Outdoor Insulators - Part 1: Pollution Basics and Distant Case	677
<i>Johnny Wardman, Igor Gutman</i>	

Effects of Volcanic Ash on HV Outdoor Insulation - Part 2: Investigations at the University of Canterbury	696
<i>Johnny Wardman, Igor Gutman</i>	

VOLUME 2

Buying Polymer Insulation: Point of View of a Utility in a Regulated Market	706
<i>Manuel V. Guzman, Hector C. Lara, Isaias Ramirez-Vazquez, V. R. Garcia-Colon</i>	
Development Trends of High Voltage Cable Accessories	731
<i>Klaus-Dieter Haim</i>	
Hollow Core Composite Insulators for UHV & UHVDC Applications	757
<i>Anders Holmberg, Mattias Lundborg</i>	
RTV Silicone HVIC - Advancing the Value Proposition	769
<i>Chris McConnery</i>	
Switching Surge Reduction with Line Arresters to Meet Critical Clearances on 500 kV Lines	808
<i>Rao Thallam, Jim Hunt, Albert J. Keri</i>	
Effect of Surface Treatment of Porcelain Insulators Under DC & AC Stress	831
<i>Heiko Jahn, Wolfgang Manzke</i>	
Testing Cable Terminations Under Polluted Conditions	843
<i>Heiko Jahn, Wolfgang Manzke</i>	
Semiconductive Coatings to Prevent Ice Accretion on Insulators	858
<i>Zhidong Jia</i>	
Station Class Surge Arrester Application on Underbuilt Distribution Lines	898
<i>Aram Khalil-Pour, Dan Ward</i>	
Line Surge Arresters - A Bunch of Advantages	944
<i>Herbert Klausner</i>	
Highlight Wintrack Tower System Testing - Final Draft	963
<i>Peter Kolmeijer</i>	
Laboratory & Field Testing on High Voltage Cables	973
<i>John Kuffel, Ivan Boev, Ziqin Li, Sarajit Banerjee, Howard Sedding</i>	
Review 30 Years Development of Silicone Rubber Insulators: The Chinese Experience	982
<i>Xidong Liang, Jiafu Wang</i>	
Considerations of Laboratory Setup for Corona and Radio Influence Voltage Tests on Transmission Line Assemblies	1010
<i>Z. Li</i>	
Arresters with (Extra) High Energy Absorption Capability for Rio-Madeira-Project (Brazil) - Test Configuration and Results in TRIDELTA Test Lab	1034
<i>D. Hauck, H. Klaube, A. Calazans, F. Malpiece, U. Plotner, R. Rondina, A. Rafailov</i>	
Productivity & Quality Issues in Production of HV Cable Joint Bodies Made with LSR	1061
<i>Gerhard Mais, Rainer F. Roder, Matthias Freilinger</i>	
Impact of E-Field on Polymeric Insulators	1084
<i>Sebastian Marra</i>	
Externally Gapped Distribution Arresters to Solve TOV Issues	1100
<i>Manuel L. B. Martinez, Estacio T. Wanderley Neto, Arimatea A. Nunes</i>	
Development of "Non Gunpowder" Disconnectors	1147
<i>Manuel L. B. Martinez, Estacio T. Wanderley Neto, Aelfleniton M. M. Diniz, B. N. Campos</i>	
Corrosion Problems Affecting Porcelain & Glass Line DC Insulators in China	1186
<i>Hongwei Mei</i>	
Selection Criteria for AC/DC Insulators at NamPower	1205
<i>Gerton N. J. Mouton, Gernot Heger</i>	
GECOL Experience on 400 KV HTV Silicone Insulators	1237
<i>Nagi Hassan Karroud</i>	
Development of Outdoor Terminations for Up to 500KV XLPE Cable	1240
<i>Hiroshi Niinobe, Koichi Ono, Takahisa Tabuchi, Shinji Maruichi, Anna Mori</i>	
Experience Detecting Deteriorated Composite Insulators in Service	1269
<i>Horacio Jose Parisi, Jose Vicente Insogna</i>	
Analysis of Polymer Insulator Failures on UHV Lines Korea	1308
<i>Hyunmin Park, Yunseog Lim, Gyeongbae Won, Jungwon Lee, Bon-Woo Koo</i>	
Surge Arresters and Travelling Waves	1327
<i>D. F. Peelo, J. H. Sawada</i>	

Composite Insulators - Market Development & Experience	1348
<i>Alberto Pignini</i>	
Evaluation of the Performance of Polluted Insulators - The IEC Simplified Approach Against the Statistical Approach	1375
<i>A. Pignini, I. Gutman</i>	
Lightning Protection of Overhead Distribution and Transmission Lines by Multi-Chamber Arresters and Insulators-Arresters of a Novel Design	1404
<i>G. V. Podporkin, E. Yu. Enkin, V. E. Pilshikov</i>	

VOLUME 3

Development of a Surge Arrester for a 1200 kV System Voltage	1441
<i>B. Rajaiah, K. Phanendar, R. Puyane</i>	
Application of EGLAs on 132 kV & 500 kV Overhead Lines in Malaysia	1455
<i>Iryani Mohamed Rawi</i>	
Development and Testing of an Insulating Composite Cross-Arm for Application on 400 kV Lattice Towers	1477
<i>S. M. Rowland, I. Cotton, C. Zachariades, Frank Allison, V. Peesapatti, D. Chambers</i>	
An Overview of CIGRE Contributions for the Standardization of Composite Insulators	1501
<i>Frank Schmuck</i>	
Evaluating the Response of Surge Arresters to Temporary Overvoltages	1509
<i>Jens Schoene, Thomas E. McDermott, Reigh Walling, Chandra Pallem</i>	
Silicone Insulator Coatings - Hydrophobicity Upgrade for Porcelain & Glass Insulators	1535
<i>Georg Simson</i>	
Evaluation of Overhead Line Components	1568
<i>V. Sklenicka, K. Kreislova, J. Brejcha</i>	
Research of Unexplained Automatic Reclosures	1601
<i>V. Sklenicka, L. Kocis, P. Spurny</i>	
Improved Processing Technologies for High-Voltage Long Rod & Hollow Core Insulators	1625
<i>Hanno Steinzen</i>	
UV & IR Inspection: Opposite Sides of Same Coin?	1641
<i>Roel Stolper</i>	
Heavy Rain Flashover Test Method for EHV/UHV Vertical Bushings & Flashover Characteristics Under Pollution	1654
<i>Zhiyi Su, Xinzhe Yu</i>	
The Effect of Voltage Types on Contamination of Insulators	1664
<i>Boaqlang Sun</i>	
Experience with Live-Line Insulator Maintenance in Freezing Conditions	1683
<i>David Swatek, Jeffery Laninga, William M. McDermid</i>	
HV & UHV Bushing Design Optimization from Safety Point of View	1712
<i>G. Testin P. Cardano, M. Sehovac, M. Boutlendj, A. Pignini</i>	
Insulation Selection for Overhead Lines and Substations: Problems, Decisions & Trends through FGC UES Standards	1731
<i>V. Y. Seleznev, N. A. Vaga, E. A. Solomonik</i>	
CSA Standard on Composite Cutouts	1750
<i>John Vandermaar</i>	
Safety Issues in Case of Internal Arc on HV Cable Terminations, Bushings & Surge Arresters	1771
<i>U. Vercellotti, A. Sironi</i>	
Impact of Key Market Trends on Silicone Formulations and Technical Support	1803
<i>Toby Vick</i>	
Transmission Line Design Considerations for Polymer Insulators	1824
<i>Nathan Vogt</i>	
Multiple Factors Guarantee Reliable, High Performance Composite Insulator	1851
<i>Hong-Yu Wang, Gui-Qing Ren, Zhen-Fang Guo, Xue-Wei Bo</i>	
Abnormal Heating and Irregular Fracture about Operating Composite Insulators	1871
<i>Liming Wang</i>	
High Voltage Bushing Tests	1897
<i>May Wang, John Vandermaar</i>	
Research on 220kv-1000kv Composite Hollow Core Insulator Injection Moulding Machine	1923
<i>Shihai Wang</i>	

Research on Shed Crack of Composite Insulators Used in Strong Wind Area	1960
<i>Xilin Wang, Zhengyi Zhu, Guoxiang Ma, Zhidong Jia, Zhicheng Guan</i>	
Development of Outdoor Terminations for up to 500kv XLPE Cable	1965
<i>Hiroshi Niinobe, Koichi Ono, Takahisa Tabuchi, Shinji Maruichi, Anna Mori, Akitoshi Watanabe</i>	
Analysis & Prevention of External Insulation Failures on Potential Transformers at \pm kV Converter Stations	1983
<i>Wei Jie, Zhiyi Su</i>	
Arrester Lifetime as a Function of Their Quality	2008
<i>Wolfgang Welsch</i>	
Transmission Line Arresters Case Studies	2017
<i>John Williamson</i>	
Reducing Losses on Electrical Transmission Lines with the Use of Arresters	2046
<i>Jonathan Woodworth</i>	
The Solution of Rubber Injection Machine's Intelligent Management to Insulator Manufacturing.....	2068
<i>Maoni Yi</i>	
New Concept & Innovations Regarding Lightning Arrester Solutions.....	2087
<i>Jonathan Zahnbrecher</i>	
Electrical Performance of Shearbolt Connectors.....	2098
<i>Martin Zapf</i>	
Artificial Contamination Test for Insulators.....	2122
<i>Chuyan Zhang</i>	
Author Index	