AUTOMATED WASHING SYSTEM - OVERVIEW

ENERGIZED & POLLUTED INSULATORS WASHING SYSTEM
For New & Operational
Outdoor Gantries & Substations
(LV/MV/HV/EHV Low, Medium, High & Extremely High Voltage)

Design, Engineering, Manufacturing and Project Management expertise on Power Lines & Power Generation Industry
Oil & Gas OEM spare parts, Mechanical works, Process Automation, Technical & Procurement services end-to-end solutions
Since 1998.
COST-EFFECTIVE MAINTENANCE SOLUTIONS TO PREVENT “TRIPS” AND POWER OUTAGES on New & Operational Outdoor Gantries & Substations

AUTOMATED WASHING SYSTEM (AWS)

CLEANING ENERGIZED INSULATORS FROM POLLUTANTS

http://www.wilorton.com css@wilorton.info
COST-EFFECTIVE MAINTENANCE SOLUTIONS TO PREVENT “TRIPS” AND POWER OUTAGES ON ENERGIZED SUBSTATIONS & GANTRIES

Scope: CLEANING ENERGIZED & POLLUTED INSULATORS FROM POLLUTANTS
TENSION-SUSPENSION GLASS INSULATORS
(THE RED LINE REPRESENTS THE PIPING OF THE AUTOMATED WASHING SYSTEM)
SUSPENSION GLASS INSULATORS

(THE RED LINE REPRESENTS THE PIPING OF THE AUTOMATED WASHING SYSTEM)
AUTOMATED WASHING SYSTEM - AWS
Outdoor Gantries and Substations

SUSPENSION GLASS INSULATORS
SAMPLE PICTURE SHOWING WASHING JET STREAM

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TENSION GLASS INSULATORS
(SAMPLE PICTURE SHOWING WASHING JET STREAM)
Water pressure, Washing frequency:

The water pressure depends on the type of contaminant to be washed and may vary from 350 kPa to 3000 kPa (50 psi to 430 psi) or higher value.

Salt and airborne contaminates such as dust, industrial, chemical and agricultural emissions build up on transmission and distribution system equipment, increasing the potential for conductivity and arc-over at the insulators.

The washing frequency is dictated by the type of contaminant, and its rate of buildup on the insulator.

The parameters automatically managed include daily, weekly or monthly washing schedules and, once the parameters have been set, the washing cycles are executed without operator(s) assistance.

The user is programming automatic washing cycles on daily/weekly/monthly basis to keep energized insulators clean from contaminant, preventing power outages.

The washing control system, preliminarily checks that all pre-conditions are met, i.e.:

- Storage tank, water level
- Water resistivity/conductivity level
- Wind speed
- Electric system
- Water system pressure

The duration of one complete substation washing cycle (all zones are washed) is less than one hour.

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PLAY LIVE VIDEO:
https://www.youtube.com/watch?v=3GYKkKWVZR8
GIS-400 GANTRIES DETAIL

(THE RED LINE REPRESENTS THE PIPING OF THE AUTOMATED WASHING SYSTEM)
AUTOMATED WASHING SYSTEM - AWS
Outdoor Gantries and Substations

GIS-400 SF-6
(THE RED LINE REPRESENTS THE PIPING
OF THE AUTOMATED WASHING SYSTEM)

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GIS-400 SF-6
(SAMPLE PICTURE SHOWING WASHING JET STREAM)
Each wash zone is typically made by 3 insulators of same type.
Three insulators are washed at the same time, in approx. 15-25 seconds.
Water envelopes and swamps 3 insulators in one surge. Each washing zone is controlled by no. 1 solenoid valve.
Each zone is washed sequentially from one group to another. The washing sequence is dictated by the wind direction & automatically controlled by the SCADA control system.

PLAY LIVE VIDEO: https://www.youtube.com/watch?v=noCFx1yRiTk
AUTOMATED WASHING SYSTEM - AWS
Outdoor Gantries and Substations

ENERGIZED & POLLUTED INSULATORS “AUTOMATED WASHING SYSTEM” INSTALLABLE ON EXISTING & NEW SUBSTATIONS
RAS DJINET DAEWOO ALGERIA GIS-400 kV SUBSTATION
AUTOMATED WASHING SYSTEM - AWS
Outdoor Gantries and Substations

ENERGIZED & POLLUTED INSULATORS “AUTOMATED WASHING SYSTEM”
INSTALLABLE ON EXISTING & NEW SUBSTATIONS

PUMP STATION

Nos. 2 Centrifugal pumps (Redundancy 100%)
No. 1 Storage water tank

PLAY LIVE VIDEO:
https://www.youtube.com/watch?v=e3PLJn3P0S8

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ENERGIZED & POLLUTED INSULATORS “AUTOMATED WASHING SYSTEM”
INSTALLABLE ON EXISTING & NEW SUBSTATIONS

GIS-500 kV
SAMPLE PICTURES

230/33/11 kV SUBSTATION - OVERALL NOS. 405
INSULATORS – 99 WASH ZONES – BESHAY STEEL EGYPT

AUTOMATED WASHING SYSTEM

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PLAY LIVE VIDEO:
https://www.youtube.com/watch?v=pT-Qz9nVbbY

PLAY LIVE VIDEO:
https://www.youtube.com/watch?v=pT-Qz9nVbbY
ENERGIZED & POLLUTED INSULATORS “AUTOMATED WASHING SYSTEM” INSTALLABLE ON EXISTING & NEW SUBSTATIONS

Control system:
- No. 1 SCADA control panel, complete with HMI touch panel SIMANTIC TP2200 (22”), touch screen, CPU Siemens S7-1500, for indoor installation (Control room).
- Electrical system, junction boxes, solenoid valves, flow switches, pressure controlling system, etc.

Weather station Anemometers (Redundancy: 100%):
Detects the wind direction and speed. The overall system is designed to provide an effective washing cycle without danger of over-spraying in a wind up to max. 7 (seven) m/sec from any direction. The monitor should be in a position where it is unaffected by any nearby buildings.

Demi-Water specifications:
- For 500 kV Energized Insulators washing: Resistivity $\Omega \cdot \text{cm} > 20000$, Conductivity $\mu \text{S/cm} < 50$
- For 220 kV Energized Insulators washing: $\Omega \cdot \text{cm} > 10000$, $\mu \text{S/cm} < 100$
- For 110-132 kV Energized Insulators washing: $\Omega \cdot \text{cm} > 10000$, $\mu \text{S/cm} < 100$
- For 33/11 kV Energized Insulators washing: $\Omega \cdot \text{cm} > 1500$, $\mu \text{S/cm} < 660$

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ENERGIZED & POLLUTED INSULATORS “AUTOMATED WASHING SYSTEM” INSTALLABLE ON EXISTING & NEW S.S./GANTRIES
The scope of this document is to outline the procedures used for cleaning contaminated electrical insulators (excluding nuclear, toxic, and hazardous chemical contaminants), of all types, installing the Energized Insulators Washing System.

Because of the great variety of conditions, practices, electrical system design, and contamination possibilities, this document is outlined to describe a number of approaches to insulator cleaning on power systems. All factors must be considered to specific situations in deciding whether and how to use the information in this document.

Normative references:
The following referenced documents are indispensable for the application of this guide. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

CEI 11-27 Edition IV - CEI EN 50110: Works on electrical plants (DL 81/08) 2014 – Adjustment of the DL and DV distances to the CEI standard EN 50110-1
ESTI n. 407: Safety rules for works on high voltage overhead lines, Switzerland
EN 353/EN 361/EN 363: Part 1/Personal protective equipment against falls from a height – Body harnesses/Fall arrest systems
IEEE Std 4™-1995, IEEE Standard Techniques for High-Voltage Testing. 3,4
IEEE Std 957-2005, Guide for cleaning insulators

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ENERGIZED & POLLUTED INSULATORS WASHING SYSTEMS

COST-EFFECTIVE MAINTENANCE SOLUTIONS TO PREVENT “TRIPS” AND POWER OUTAGES ON ENERGIZED POWER LINES, SUBSTATIONS & GANTRIES

ENERGIZED & POLLUTED INSULATORS WASHING SYSTEM
For New and Operational T&D Power Lines, Outdoor Gantries and Substations
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ISO 9001 : 2015 BUREAU VERITAS CERTIFICATION NO. CH10196772

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