SEDIVER

TOUGHENED GLASS INSULATORS SOLUTIONS FOR POLLUTED ENVIRONMENTS

Experts & Pioneers

WORLDWIDE - 2025

Sediver,
Experts and Pioneers in insulation technology

Sediver was established in 1898 in Saint-Yorre, France. Its history has been shaped by a series of innovations – and successes – that ultimately made Sediver what it is today: the partner of rahter than for choice of utilities around the world.

We bring deep knowledge and on-the-ground experience in designing power lines and equipping them with high-quality toughened glass insulators suitable for all environments.

Our significant recurring investments in R&D have resulted in a level of technical know- how that is unique on the market. Today, we are proud of the relationships we have built with our customers around the world. Our mission is to give all people access to electricity while keeping environmental impacts as low as possible.

This catalogue presents a selection of the Sediver® toughened glass insulator range of products answering the needs of worldwide customers in term of technical standards (ANSI/IEC/BS), best practices and environmental conditions. Sediver® toughened glass insulators meet and exceed the performance requirements of any standard.

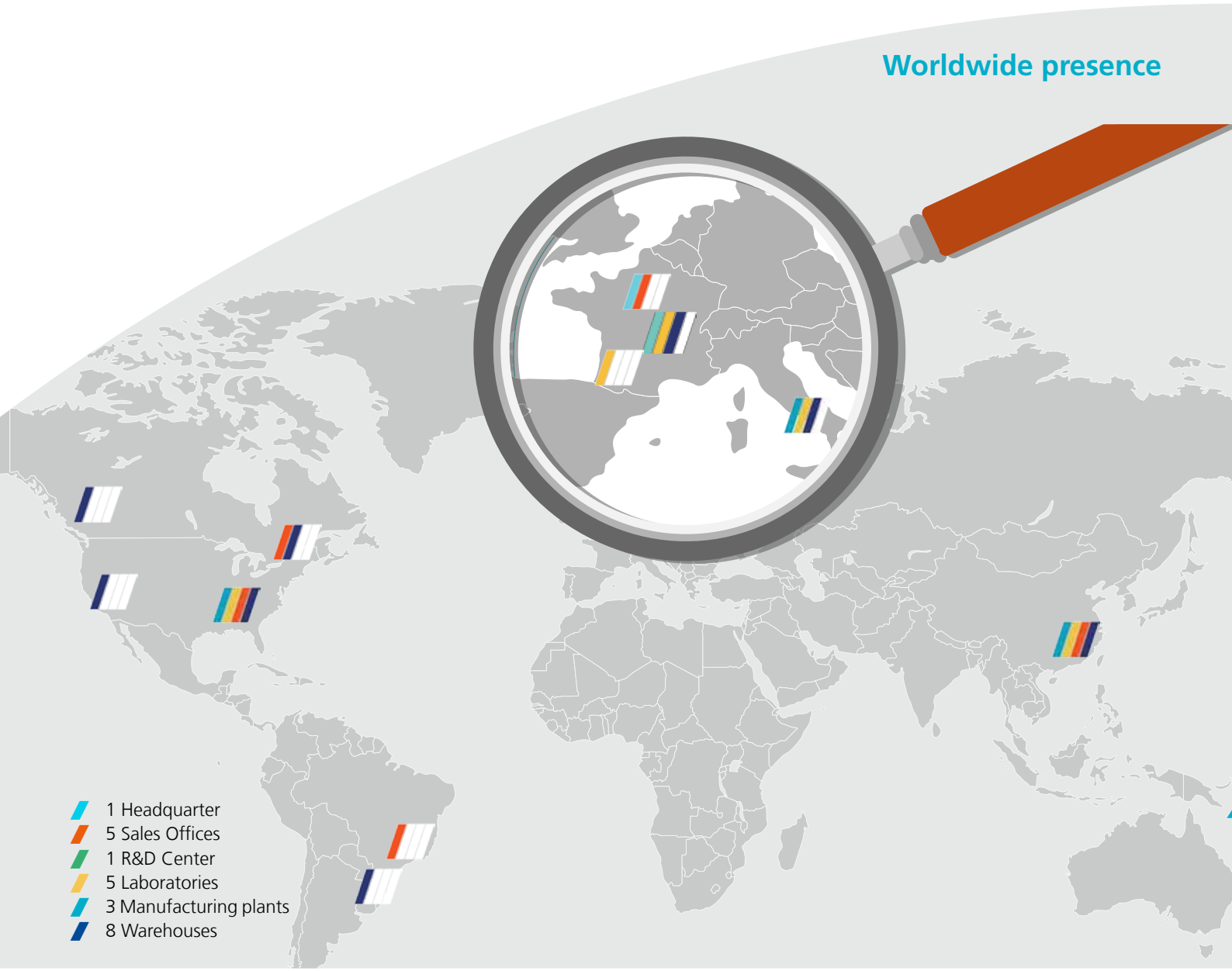
600+ million toughened glass insulators installed in more than 150 countries on lines up to **1,100 kV AC**,

11+ million toughened glass **DC** insulators installed on lines up to 800 kV,

15 million insulators installed on lines **≥735 kV AC&DC UHV**,

5+ million Sedicoat insulators, silicone coated toughened glass insulators for both AC and DC applications.

Worldwide presence



We support the sustainable energy transition
providing utilities with the most reliable and sustainable insulating technology

Our decades of experience have given us ample opportunities to experiment with and test different insulator technologies. Since 1947 we have maintained a sharp focus on the one technology capable of giving our customers the confidence and assurance they demand: toughened glass.

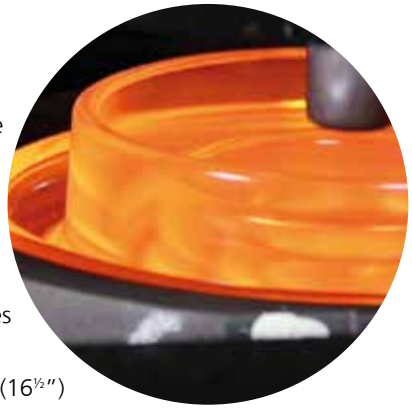
Since then, we've never stopped innovating our product in order to provide:

- Greater efficiency in all operating conditions
- Longer lifespans in any environments
- Easier installation
- Simpler line maintenance
- Lower total cost of ownership

And, with one of the most extensive product lines on the market, we are positioned to support all types of projects, anywhere in the world.

We manufacture

High quality toughened glass insulators



Why glass?

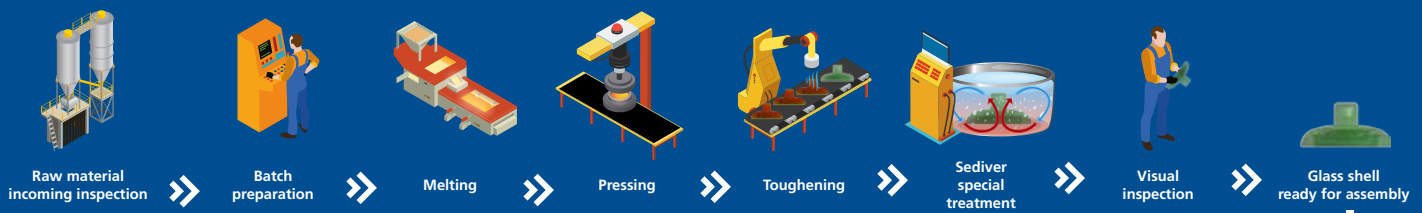
Glass is fully amorphous, it is a frozen liquid. Therefore, it has no crystallographic structure responsible for aging. Through our unique manufacturing process the glass becomes even more reliable, stable, and strong. We have decades of knowledge around this material enabling us to provide unique benefits to our customers throughout the lifecycle of their transmission line.

Our own distinctive manufacturing process

- Ensures an **outstanding homogeneity in the chemical composition of the glass** and provides **high purity** glass.
- Our unique know-how enables us to create **complex glass shapes** and products up to 420 mm (16½") in diameter and weighing more than 10 kg (22 lbs.).
- The toughening process developed by Sediver generates a compressive pre-stress on the surface of the glass shells which confers to the glass a high mechanical strength & high resistance to thermal shocks and mechanical impacts as well as an immunity to the effects of aging.
- A highly automated manufacturing process, perfected along the years by Sediver, guarantees consistent high levels of quality in the materials and the final product assembly.
- The assembly is done by a **specific hot curing process**, using a chemically inert cement (high strength aluminous cement) immune to the cement growth phenomena, providing outstanding mechanical stability over time & a very high mechanical strength.

- **Galvanization & zinc sleeves prevent corrosion of metal fittings**. These features help extend the service life of our insulators.
- **Very stringent quality system** comprises systematic controls and inspection of the insulators during manufacturing. The entire process is **constantly automaticaly monitored** and supervised by qualified inspectors.
- **Our process is standardized across all our production facilities, with a guaranteed consistency of our product performance worldwide.**
- Our **Quality Assurance system** and individually marked units grant the full traceability of our insulators.
- **Low shattering rate:** Guaranteed < 1/10,000 per year due to the high purity of Sediver® glass and outstanding manufacturing processes.

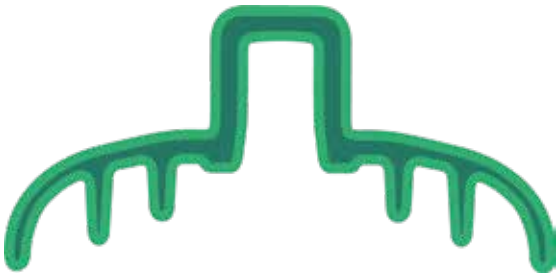
GLASS LINE



ASSEMBLY LINE

Focus on toughening process

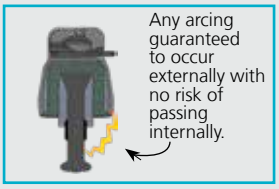
The toughening process consists of **inducing pre-stresses to the glass shell** by a rapid and precisely controlled cooling of the glass shell. The pre-stresses result in **compressive forces** on the outer surface layer balanced by **extension forces** inside the body of the glass shell.



Toughening provides our insulators:

- **High mechanical** strength.
- **High resistance to thermal shocks.**
- **Immunity to aging** thanks to the toughening treatment.
- **High resistance to the most extreme surges** such as switching surges, steep front lightning strikes and power arcs.
- Unique property of **breaking in a predictable pattern** when overstressed mechanically or electrically. Crumbling of the glass shell always results in fragments of safety glass with no razor–sharp shards.
- **Binary Nature.** Only exists in 2 well-defined states: fully intact or as a mechanically & electrically safe stub. Visual inspection provides 100% infallible data at glance: no possible hidden cracks, ease of inspection, with no instruments needed.

Definition of binary status



Intact shell	Damaged shell
• Guaranteed absence of internal cracks or electrical punctures • 100% of the mechanical rating guaranteed even in harsh conditions • 100% electrical strength	• Residual mechanical strength: 80% of the mechanical rating guaranteed even in harsh contidions • Residual electrical strength: guarantted to flashover externally
Therefore	
• Ease of inspection: No need to climb structures or to use sophisticated instrumentation. • Enhanced workers' safety in live line operations. • Very low cost of inspection for the entire service life of the line.	• No risk of separation or line drops. • No urgency in replacing a unit with broken shell. • Long-term savings in maintenance operations.

Global user benefits

- Superior mechanical, electrical, and safety performance
- Very **resistant** to rough handling.
- **Easy transportation** and installation at site.
- **No risk of installing damaged unit.**
- Residual mechanical strength: **no urgency in replacing an insulator with a broken glass shell.**
- **The lifetime of Sediver® glass insulators equals or exceeds the lifetime of the conductors, hardware and structures.**
- Sediver® toughened glass insulators offer **the lowest life cycle cost of all insulating solutions.**

Our worldwide network of experts
at your service

Innovating to bring our customers greater added value every day

At Sediver, we invest heavily in R&D. The drive to innovate is one of our people's biggest motivators. For a mission-critical product like high-voltage transmission line insulators, innovation is not only possible, it is vital!

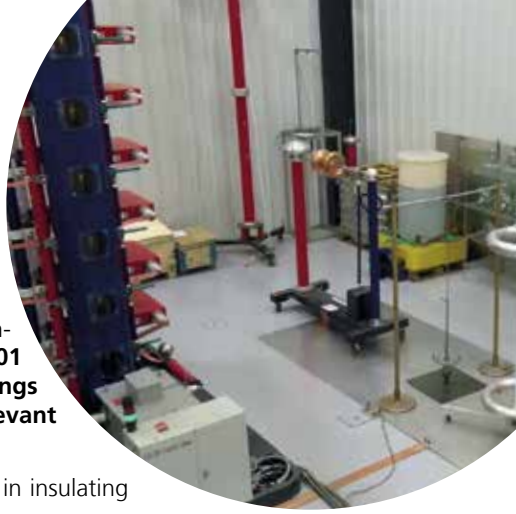
Our R&D department brings a high level of engagement and commitment to improve the performance, sustainability, and reliability of our products and services.

- By **working closely with our customers** to help them design the most efficient lines possible and by developing custom solutions for their projects.
- By **developing products** for the environments in which they will be used. We deliver solutions whose implementation, operation, maintenance, and resistance to harsh environments have been researched and tested.
- By **offering training classes** to help our customers keep their knowledge up to date with the latest regulatory and technical information.
- By **sharing our results** with the international technical community and with grid operators around the world through regular technical publications.

Technical support even from the beginning of your project

Our team performs:

- Research and testing through our global network of laboratories, including electric field simulations and analysis
- Development of string designs and custom solutions with dedicated quality and testing programs
- In-field assessments of in-service insulators and on-site pollution measurements
- Technical consultation on selection of insulation solutions and specifications
- Solving technical issues relating to the operating conditions of the lines
- Evaluating end-of-life timeline for in-service insulators



Our laboratory network

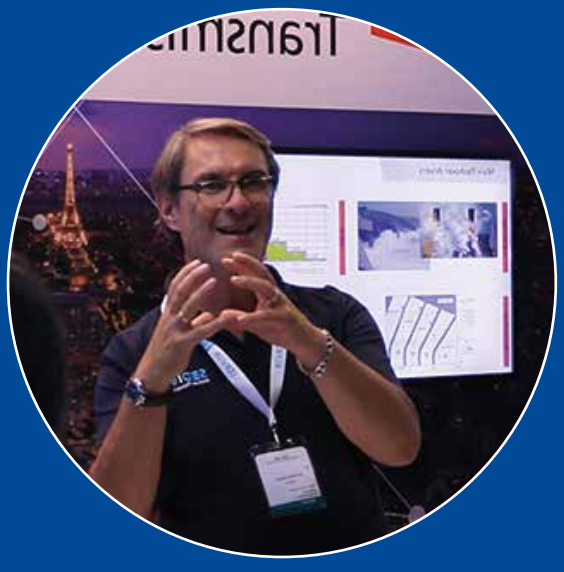
The equipment and facilities of our 5 research and testing centers ensure the development of insulators with excellent long-term behavior and performance. Sediver laboratories are all **ISO 9001 or ISO 17025** certified. **We can perform dielectric tests on single units and complete strings of insulators of glass, porcelain and composite (polymer) insulators according to relevant standards such as IEC, ANSI and CSA.**

- Investigation and research in **material science**: vital to the development and innovation in insulating technologies
- **Mechanical** endurance testing: Essential to designing insulators with excellent long-term performance under extreme service conditions
- Evaluation of the insulators' **electrical** performance: Fundamental to assess the behavior of any type of insulator string configuration
- Evaluation of the **pollution** performance of insulators and complete strings: Critical for the choice of the right insulator adapted to each specific environmental condition

Main testing equipment per country	China	France	Italy	USA
Dielectric tests on insulator units	✔	✔	✔	✔
Dielectric tests on complete strings		up to 800 kV*		
AC Salt-fog Pollution tests		250 kV		
AC Solid layer Pollution tests		250 kV		
DC Pollution tests (salt fog/solid layer)		350 kV		
DC Sample tests according to IEC 61325	✔	✔	✔	✔
DC Type tests according to IEC 61325		✔		
Mechanical tests on insulator units	✔	✔	✔	✔
Thermal-mechanical tests	✔	✔	✔	✔
Long duration vibration tests on complete strings		2 Hz to 30 Hz *1		
Standard sample tests according to national and international standards	✔	✔	✔	✔
Fatigue test station		✔		

* line equipment

*1 2 Hz to 30 Hz, 60 kN per conductor, 6 conductors - 40 m span



Toughened glass insulators technology & pollution
The basics

Defining solid pollution

Any contaminants deposited over the surface of the insulator impacting the performance of the string

INDUSTRIAL

SAND/DUST

COASTAL

ROAD SALT/SNOW & ICE

WILDLIFE

AGRICULTURAL

Pollution accumulation, what are the risks? How do flashover occur?

1- Contamination accumulation is a time driven process dependent on the environmental conditions. Pollution builds up on an insulator until it reaches a critical level.

2- Wetting of the solid layer pollution by rain, dew, fog etc.

3- Development of surface leakage current in the conductive layer (pollution+water). This surface leakage current along the polluted surface generates dry bands.

4- Localised drying causes partial flashover of dry bands.

5- If the resistance of the remaining layer is low enough, arcs can extend along the insulator.

6- Flashover.

How to cope
with pollution?

Step 1: Measure pollution levels

Quantifies the accumulation of conductive contaminants on an insulator.

Represents the amount of contamination on an insulator undissolved by water

Once ESDD and NSDD are defined, it is possible to establish the pollution class as per IEC 60815-1.

Step 2: Select the proper profile

Based on decades of experience, Sediver engineers developed and designed different types of insulators adapted to all climates and environments, such as described in technical standard IEC 60815-1

Standard profile

For environments with low to average pollution

Antipollution profile

For high-pollution environments

Aerodynamic profile

For desert or specific pollution applications

Outerib profile

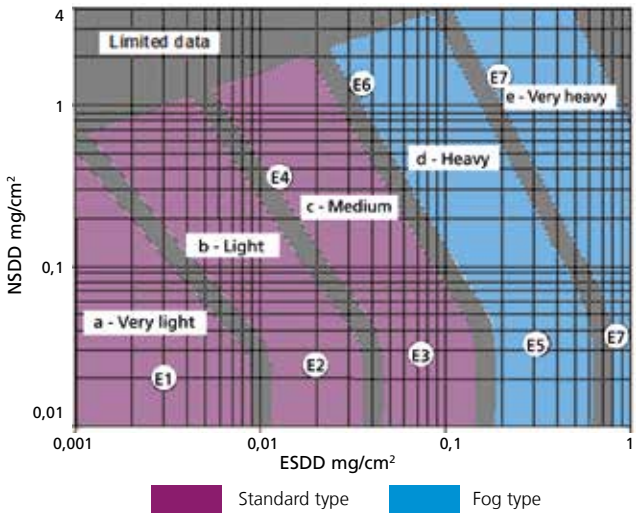
For environments with high solid pollution

Insulator profile selection

Technical standard IEC 60815-1 defines 5 levels of pollution according to the contamination severity: very light, light, medium, heavy and very heavy.

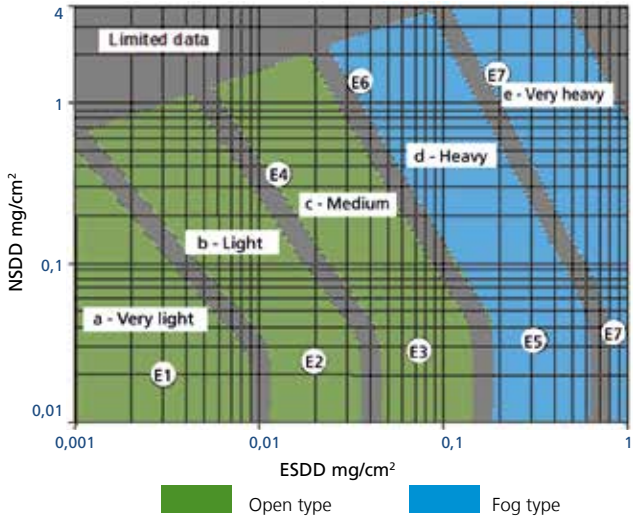
The levels of pollution are defined according to the Equivalent Salt Deposit Density (ESDD) and the Non-Soluble Deposit Density (NSDD) on the surface of the insulator.

Industrial, agricultural, coastal pollution



In the case of industrial, agricultural and coastal pollution, Sediver recommends the use of the standard profile in very light, light and medium polluted areas and the fog type profile in heavy and very heavy polluted areas.

Desert pollution

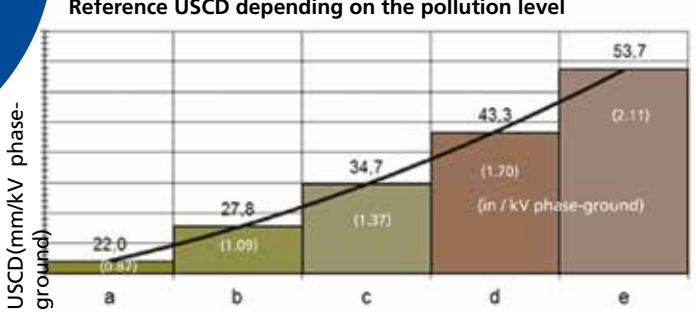


In the case of desert pollution Sediver recommends the use of the open profile in very light, light and medium polluted areas and the fog type profile in heavy and very heavy polluted areas.

Insulation level

The number of insulators per string depends on the maximum voltage of the transmission line and the pollution severity of the region. It should be calculated in accordance with the specific creepage distance (USCD*) as defined by the IEC 60815-2 standard.

Reference USCD depending on the pollution level



(*) USCD = Leakage distance of the string of insulators divided by the RMS value of the highest power frequency voltage seen by the string (phase - ground).

String dimensioning example:

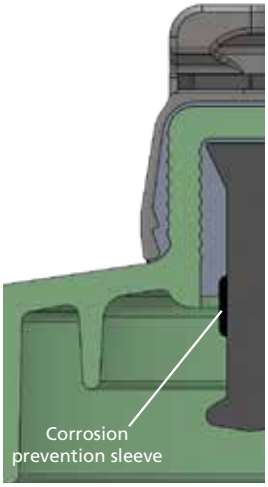
For a 230 kV line, located on the coast in a heavy pollution level
(Max. phase-ground voltage: 245 / √ 3) located on the coast in a heavy pollution level

Selected insulator: F120PB/146Z
(fog type profile with 445 mm leakage distance)

Total leakage distance needed: 43.3 x 245 / √ 3 = 6125 mm

Number of insulators in the string:
6125 / 445 = 14 insulators

Step 3: Add metal part protection



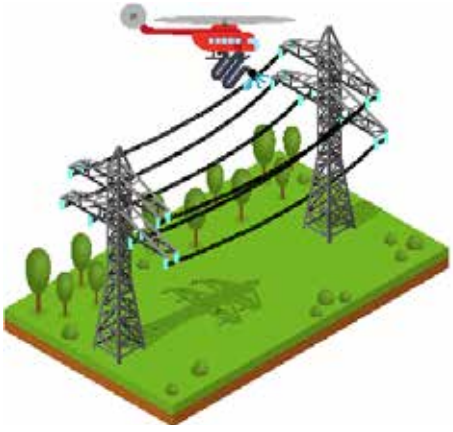
Corrosion prevention sleeve

In severely corrosive marine and industrial atmospheres, the galvanized coating on suspension insulator pins may deteriorate over time , leading to the corrosion of the pin itself. To prevent this, Sediver can supply insulators equipped with a corrosion retardation sleeve made of high-purity zinc. The insulators are then designated by "Z" (F100PB/146 with zinc sleeve becomes F100PB/146Z).

Heavy galvanization

All Sediver® ferrous metal fittings are hot-dip galvanized. IEC 60383-1 and ASTM A153-82 require a zinc coating mass of 600/610 g/m² corresponding to a thickness of 85/86 µm. In severe conditions, where this standard protection is known to be insufficient, Sediver offers enhanced protection of the cap and the pin by increasing the thickness of zinc to 120 µm, or up to 130 µm.

Step 4: Wash your insulator strings



Washing insulator strings is commonly short-term solution used to cope with service interruptions on lines in contaminated enviroments. However, this solution will not solve the problem, which is propably linked to the environment and operating contiditions of the line.

Maintenance teams can wash the string on a line energised or de-energised but it has a cost and is time resources consuming.

An in-depth study of the string and its environment (pollution assessment) will be needed to find out whether the insulator string was undersized from the outset or whether the level of pollution in its operating environment has changed, necessitating a new optimisation of its design.

Step 5: Selecting toughened glass insulators with RTV-silicone coating

In heavily polluted enviroments, selecting the most appropriate dielectric profile and string length may still result in the need to perform occasional washing of the insulators strings. Sedicoat insulators can be used to address issues on existing lines or in new construction, reducing the risk of flashovers caused by the accumulation of contamination as well as decreasing or eliminating the need to wash insulator strings.

Global user benefits

- **Eliminates or reduces the need for regular insulators washing**
- **Eliminates the risk of flashovers due to pollution**
- Superior **mechanical, electrical and safety** performance
- **No risk of installing damaged units, infalible visual inspection at a glance**
- High residual mechanical strength: **no urgency to replace stubs.**
- **The lifetime of Sediver® glass insulators equals or exceeds the lifetime of the conductors, hardware and structures.**
- Sediver® toughened glass insulators are, **above any other technology, highly suitable for safe live-line maintenance operations**

Sedicoat - RTV coated insulators
Pollution mitigation Solution

Proven solution with over 4- 1/2 million insulators in service with 25+ years of excellent performance

Sedicoat RTV Coated glass insulators

Based on extensive testing and and over 25 years of field experience with 4.5 millon RTV silicone coated (Sedicoat) insulators supplied globally, Sediver offers high-quality factory coated toughened glass insulators as part of our standard product range.

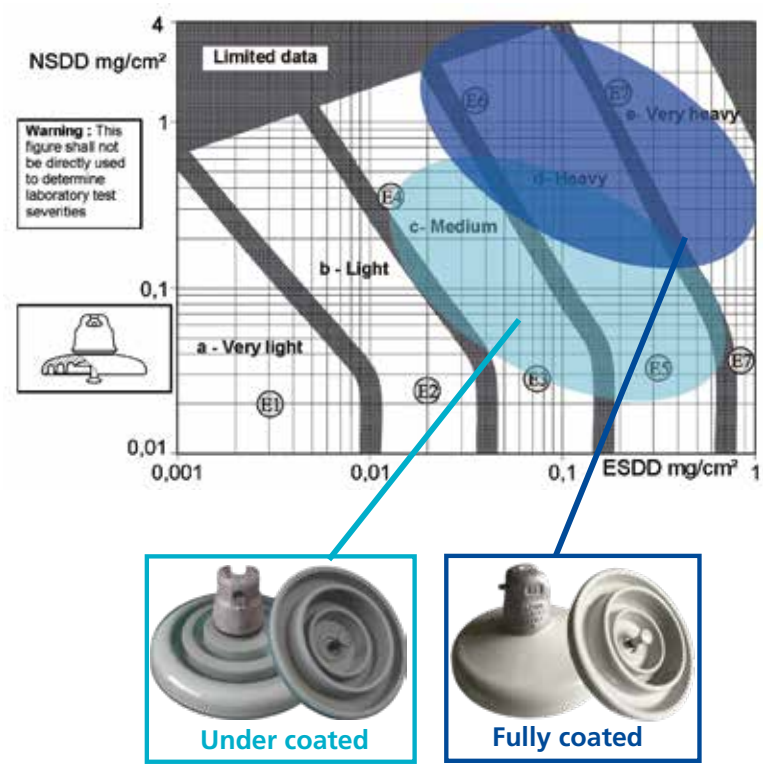
Sedicoat is a combination of a high-performance materials with a fully-controlled, industrial application process.

Sedicoat was developed to eliminate or dramatically reduce the need for washing insulator strings in areas of heavy and very heavy contamination. It also helps improve the performance of insulators in areas of medium contamination, while retaining the inherent self-detecting features and longevity of toughened glass.

While fully coated insulators were the initial approach to pollution mitigation, Sediver introduced under coated insulators for the first time in 2010 as an optional feature.

Any Sediver toughened glass insulator model can be coated.

Insulator strings in very heavy pollution classes (IEC) will generally require fully coated insulators, while undercoated insulators are suitable for medium and heavy pollution areas as shown below. For specific cases, where high NSDD levels are registered, Sediver technical support can assist engineers to evaluate the best fit on a case by case situation.



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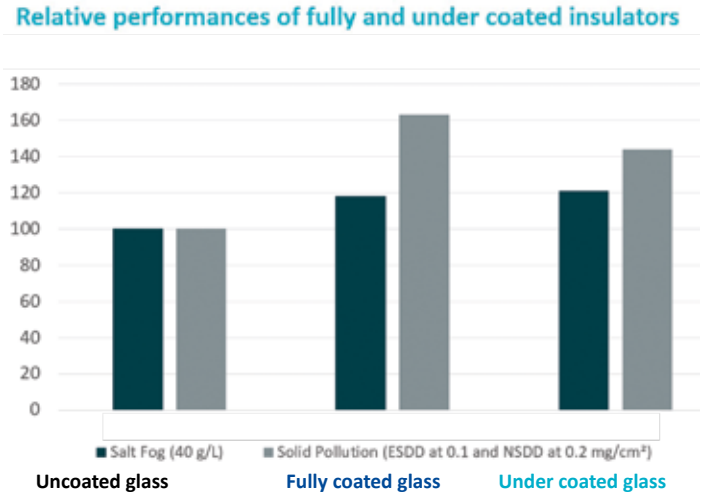
Sediver's Sedicoat maintains the unique properties of our toughened glass insulators while eliminating the risk of flashovers

Undercoated insulators

Under coating, in many cases, offers an optimal solution since it provides a performance close to a fully coated insulator, with the benefit of packing and handling conditions similar to non-coated insulators. A comparison between fully and under coated insulators is shown below



Application of Sedicoat insulators to enhance pollution performance

RTV coated insulators can be used to either optimize a string length at the design stage or to improve the performance of insulators in highly polluted environments on existing lines by increasing the effectiveness of the leakage distance compared to non-coated insulators.

For short line sections where the pollution deposit is homogeneous the use of coated glass can be justified for that entire of line.

For longer lines with multiple pollution levels along the route, a fleible approach can be implemented, utilizing coating only along certain sections of line, increasing the effectiveness of the USCD (Unified Specific Creepage distance) wherever needed. In many cases this will help achieve a line design in which similar string and tower designs can be used while adapting the string performance to each specific environment.

Long term performance of coated glass insulators

The performance and lifetime of silicone coatings depend on the silicone type, the adherence of the silicone layer to the glass shell, the thickness and the homogeneity of the coating.

To obtain optimal performance, Sediver® has set in place a stringent R&D program. The silicones qualified by Sediver® have been specifically selected to resist the severe electrical conditions cap and pin insulators face on overhead lines in polluted environments.

The application of the coating is done at the factory according to a specific industrial process qualified by Sediver.

Sediver has performed extensive testing before offering this solution while monitoring closely from the very beginning how these insulators perform and age. Assisting end users in their selection, SEDIVER also recommends a selection method which includes a 2000h long-term aging, multi-stress testas shown below:

Left: test setup.

Middle & right: at the end of the test, the strong hydrophobicity and overall condition demonstrates the strong performance and lack of erosion on Sedicoat coated insulators after 2000 h multistress test

Factory Coated Insulator
Benefits

Raw material inspection

Incoming inspection and material testing is performed in our chemical laboratory to verify the consistency and the quality of the compounds prior to being processed.

Pre-conditioning

Before application of the silicone coating, the surface of the dielectric shell is cleaned and prepared, in order to ensure perfect bonding.

Coating application

The coating is applied through a fully automated process assuring the uniformity and the thickness of the coating as well as the homogeneity of the surface.

Environment care

The in-house coating process reduces silicone losses and reduces the enviromental impact.

Curing

Controlled environmental conditions - humidity and temperature - ensure optimum curing.

Packing

Sediver has developed a customized packing system to protect the surface of the insulators from damage during transportation.

Sample test

Sample tests are done on every batch to verify compliance with Sediver acceptance criteria for bonding, thickness, homogeneity and visual aspect.

Packaging Quality Matters

Packaging Units

The packaging and palletizing methods used by SEDIVER® are the result of a precise analysis of needs, the optimization of transport methods, and the latest packaging technologies. This ensures the design of highly reliable, well-adapted packaging.

All packaging units have been specifically developed to offer effective protection for our products during transport.


Sedipack

1. Primary Packaging: Wooden Crates and Protective Elements

Sediver® offers various packaging solutions for Sedicoat insulators, depending on the resources available in the countries where our production plants are located:

• Sedipack, an innovative solution developed exclusively by Sediver® for the insulator market. Coated insulators are assembled in a short chain and packed in a vacuum-sealed bag, which is then placed inside an open-slatted wooden crate. External metal ties ensure the crate remains securely locked during transport while allowing for easy opening and closing when needed.

• In an alternative packaging method, the assembled insulator chain is successively wrapped in foam and vinyl. Once fully enclosed, it is placed in a wooden crate. This crate features the same opening and closing system as the Sedipack packaging.

2. The Logistical Unit: Pallets for Crate Transport

The logistics unit consists of a wooden pallet holding a predefined number of crates, structured to meet logistical and safety constraints. Strapping is added on both sides of the pallet to hold the load in place during handling and transport. Finally, a plastic cover protects the products from external pollution, notably dust, ensuring that shipments arrive clean at our customers' locations.

3. Traceability Systems

Each crate is specifically marked to identify the products it contains.

In addition, a traceability label is affixed to each logistics unit, listing product information, quality controls, and weight and size indications.

4. Customized Packaging

SEDIVER® can design and propose customized packaging solutions to meet specific customer requirements, in line with our production standards.

To know how to mount and handle Sedicoat insulators scan the QR code

Case studies
with RTV-coated Sediver® toughened glass insulators

Harsh environments

Historically in Peru the network was built with porcelain and toughened glass cap and pin insulators.

Because of environmental conditions (no rain, high dust, high humidity from the ocean) pollution on insulator was a major issue.

Composite insulators were installed in 1996 to cope with pollution but just a few years, failures began to occur with multiple line drops noted across the country.

The decision was taken to install silicone coated insulator as replacement of the composite insulators in areas with extreme pollution.

The use of this technology has made possible safe live-line work. Since then more than 250 000 insulators have been installed.

Coastal area pollution

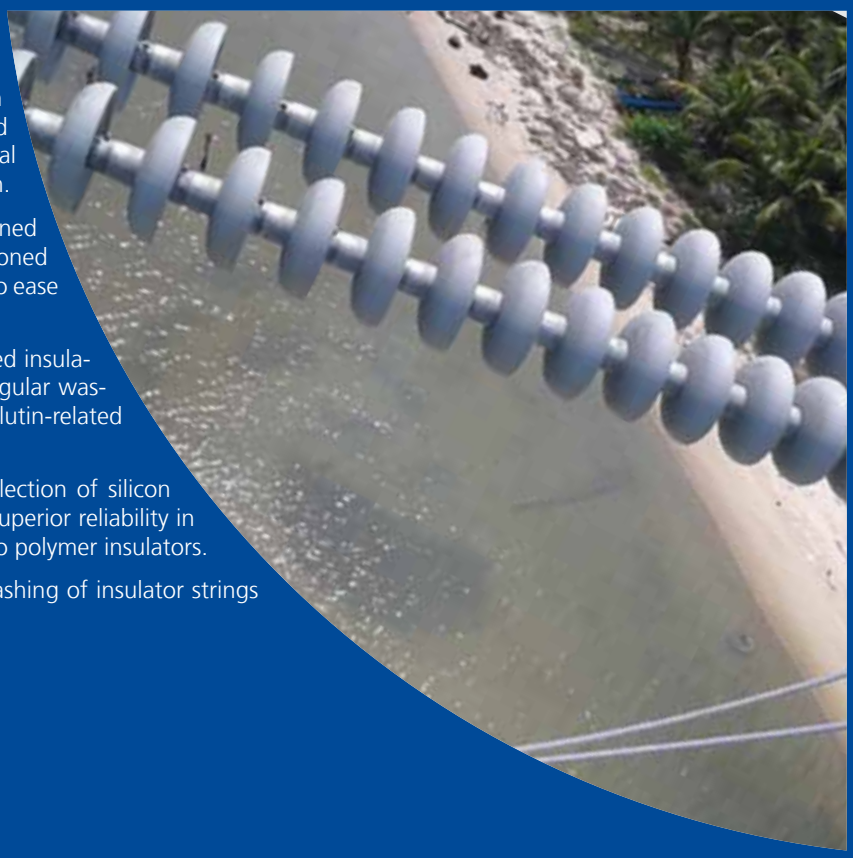
Due to its geography, most of the transmission lines in Italy are located along the coast and therefore exposed to coastal pollution, dry season, and localized industrial pollution, and the generally dry climate with little rain.

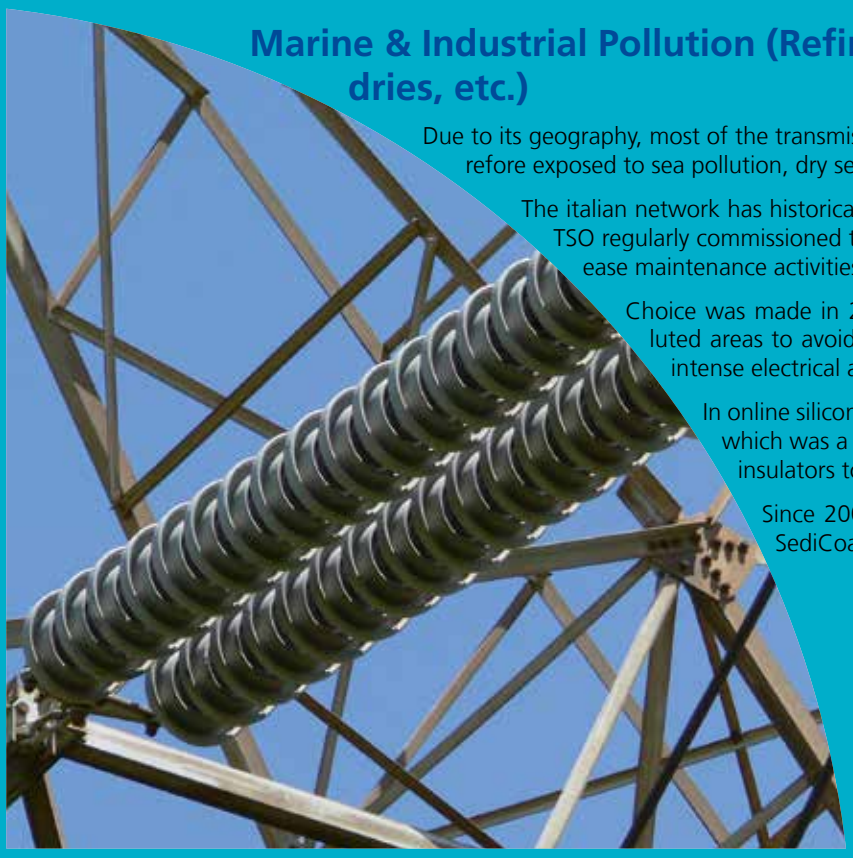
The Italian network has historically relied on toughened glass insulators, but the local TSO regularly commissioned test to evaluate new insulators technologies in order to ease maintenance activities.

The choice was made in 2005 to install silicone coated insulators in polluted areas with the goal of eliminating regular washing of insulator strings reducing the likelihood of pollutin-related flashovers.

In addition another critical factor in the ultimate selection of silicon coated toughened glass insulators was due to their superior reliability in regards to conducting safe live-line work compared to polymer insulators.

Since 2005, installation of Sedicoat insulators, no washing of insulator strings has been necessary.





Marine & Industrial Pollution (Refineries, Pulp & Paper, Foundries, etc.)

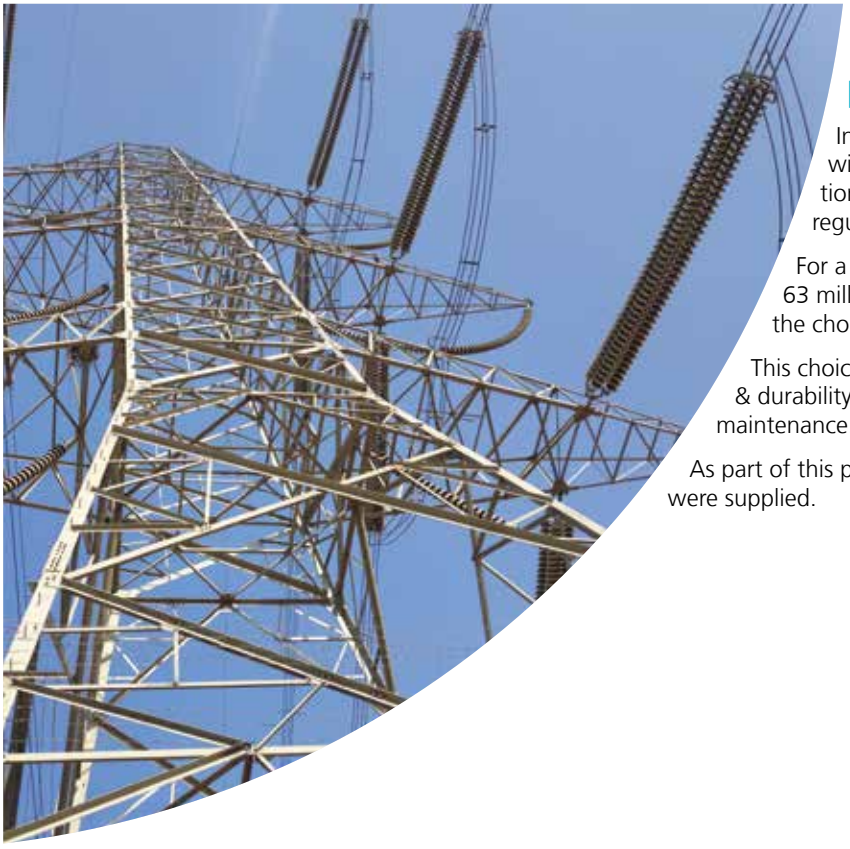
Due to its geography, most of the transmission line in Italy are located along the coast and therefore exposed to sea pollution, dry season, and locally to industrial pollution.

The italian network has historically relied on toughened glass insulators, but the local TSO regularly commissioned test to evaluate new insulators technologies addition, ease maintenance activities.

Choice was made in 2005 to implement silicone coated insulators in polluted areas to avoid regular washing activities, solve flashover issue and intense electrical activities on insulator strings.

In online silicone coated glass insulators allow also safe live line work which was a critical point in the selection, compared to composite insulators together with a higher reliability.

Since 2005, no more washing activity on line equipped with SediCoat, no flashover.



Nuclear Power Plant & severe pollution environments

In Pakistan, transmission lines are usually equipped with ceramic insulators. The grid faced service disruption issues, requiring heavy maintenance activities with regular washing (resources, time and cost).

For a new strategic transmission line (nuclear power plant, 63 milles) in an area with severe contamination, in 2021 the choice was made to select factory coated insulators.

This choice was driven by the reliability of toughened glass & durability of factory coated technology, ease of inspection & maintenance.

As part of this project, approximately 500 000 Sedicoat insulators were supplied.

Our wide range of products
at your disposal

Sediver insulators are not only designed to comply with the minimum requirements of the applicable standards. They are defined by Sediver internal superior quality requirements for a higher level of performance in service.

Sediver conceived a proprietary methodology to manufacture glass insulators using high strength aluminous cement with a specific hot curing process that provides unique mechanical and residual strength as well as mechanical stability over time.

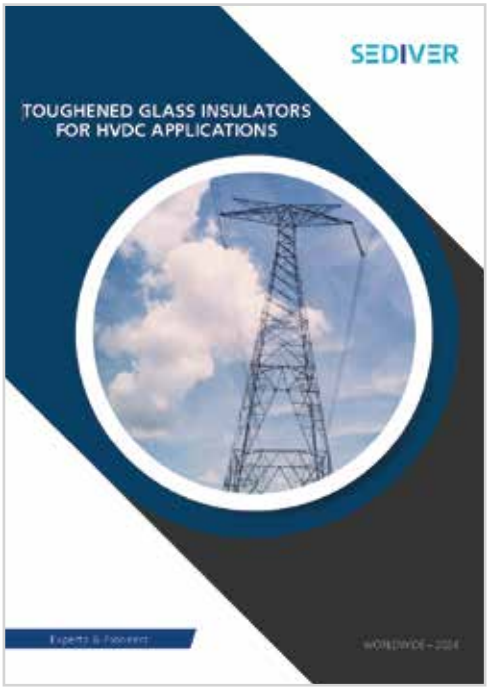
Main advantages

- Long term electrical and mechanical reliability: no aging over time. The life time of Sediver glass insulators exceeds the life time of conductors, hardware and structure
- Reduced inspection and maintenance costs
- Ease and reliability of visual inspection, no risk of hidden defects
- Lowest shattering rate of the industry thanks to the high purity of Sediver glass
- High residual mechanical strength
- Safe live-line work Mechanical rating

Product Range

- Many profiles, each with a special combination of characteristics:
- from 50 up to 840kN
- HVAC insulators up to 1,100 kV,
- HVDC insulators up to 800 kV

For more details please refer to our specific HVAC & HVDC catalogs



Active contributions to international committees

Since the very beginning of international technical cooperation, Sediver has always been an active member in fields of research and standardization in international committees and working groups dealing with all aspects of high voltage insulation; for example Sediver experts are involved in IEC working groups TC36B, CIGRE: B2, D1, C4 and contribute to the activities of NEMA-ANSI C29, IEEE OHL SC and CSA 411 standard Committees.

Extract of Sediver articles on glass published internationally:

- GEORGE JM "Pollution of overhead line insulators : update on standards and insulators performance under severe contamination for AC and DC lines" ; 2024 ; 19114 ; 2024 EDM, International Conference on Overhead Lines, April 15-18, 2024
- GEORGE JM / LEPLEY D / VIRLOGEUX F "POLLUTION AND INSULATORS", 2023 INMR World Congress, Nov 12-15 2023, Bangkok, Thailand
- GEORGE JM / LEPLEY D. "AC AND DC POLLUTION TESTING METHODS: ACCURACY AND LIMITATIONS", 2022 INMR World Congress, Oct 16 - 19 2022, Berlin, Germany
- ESPINOSA C / VO D / GEORGE JM . "OVERHEAD LINE INSULATORS IN OPERATING CONSTRAINTS UNDER SEVERELY POLLUTED CONDITIONS : THE BENEFITS OF SILICONE COATED GLASS INSULATORS AND THEIR APPLICATION AT THE PG&E DIABLO CANYON NUCLEAR POWER PLANT", 2022 CIGRE PARIS, 28 aug. - 02 sept 2022, Paris
- GEORGE JM / LEPLEY D. "AC AND DC POLLUTION TESTING METHODS: ACCURACY AND LIMITATIONS", 2022 INMR World Congress, Oct 16 - 19 2022, Berlin, Germany
- GEORGE JM / PONS C / VOSLOO WL. "ASSESSMENT OF PERFORMANCE OF INSULATORS THROUGH LEAKAGE CURRENT MONITORING UNDER CONTAMINATED CONDITIONS", CIGRE 2020 PARIS - cigre e-session 48 - Aug 24 - Sep 3 2020
- MARZINOTTO M / GEORGE JM / PIROVANO G "Field experience and laboratory results on the application of RTV coating on HVDC line" CIGRE 2020 PARIS cigre e-session 48 - Aug 24 - Sep 3 2020
- VIRLOGEUX F / PRAT S / GEORGE JM. "REVIEW OF 20 YEARS OF SILICONE COATED INSULATORS IN THE FIELD", INMR 2017 World Congress, nov 5 - 8 2017, Barcelona, Spain
- VIRLOGEUX F. / BROCARD E. / GEORGE J.M. "Correlation assessment between actual pollution performance of insulator strings in DC and theoretical models" INSUCON 2017, 13th International Insulation Conference,16-18 May 2017, Birmingham, UK
- GEORGE JM. / BROCARD E. / VIRLOGEUX F. / LEPLEY D. "DC pollution performance: current approximations & future needs" INMR 2017 World Congress, nov 5 - 8 2017, BARCELONA, SPAIN
- GEORGE J.M. "MITIGATION OF SEVERE CONTAMINATION PROBLEMS ON OVERHEAD LINES WITHOUT THE NEED FOR COMPOSITE INSULATORS", EDM International Conference on Overhead Lines - Fort Collins, Colorado, USA - April 2016
- GEORGE JM., PRAT S., VIRLOGEUX F. "Silicone coating on toughened glass insulator: Review of laboratory and field performance" INMR World Congress 2015, MUNICH, GERMANY, 2015
- VIRLOGEUX F., PRAT S., GEORGE JM. "Ageing and degradation mechanisms of silicone polymers used for outdoor electrical insulation" ISH 2015 - PILSEN, CZECH REPUBLIC
- GEORGE JM., PRAT S., VIRLOGEUX F."Coating Glass Insulators for Service in Severe Environments" INMR Quarter 4, 2014
- CIGRE WG C4.303 "Outdoor Insulation in Polluted Conditions : Guidelines for Selection and Dimensioning - Part 2 : The DC Case" CIGRE Technical Brochure 518 - 2012
- PAIVA O.; SUASSUNA R.; DUMORA D.; PARRAUD R.; FERREIRA L.; NAMORA M. "Recommendations to solve corrosion problem on HV insulator strings in tropical environment" CIGRE SYMPOSIUM CAIRNS, 2001 Paper 300-05
- DUMORA D., PARRAUD R. "Corrosion mechanism of insulators in tropical environment" CIGRE SYMPOSIUM CAIRNS, 2001 Paper 300-04
- CROUCH A.; SWIFT D.; PARRAUD R.; DE DECKER D. "Aging mechanisms of AC energised insulators" CIGRE 1990, Paper 22-203

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