SEDIVER

Sediver West Memphis - USA Factory Presentation

Experts & Pioneers

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Sediver, our technical expertise at your service

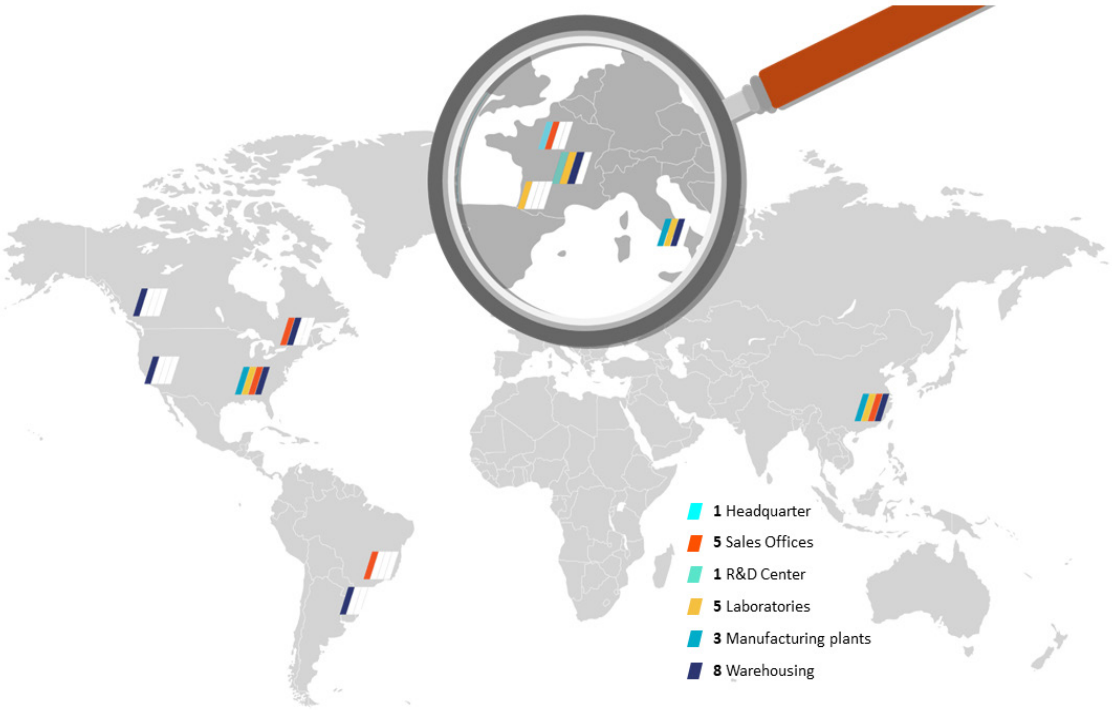
Long-term leader in its field, Sediver has been specializing for more than 70 years in the research, design, manufacturing, testing and supply of toughened glass insulators, composite insulators and composite surge arresters for High and Ultra-High Voltage power networks and railway catenary systems.

Sediver ensures the highest reliability and performance of transmission systems throughout the service time of the line, and under all environmental conditions.

Global presence and local strength

- **3 plants** that guarantee uninterrupted supply, on-time delivery and apacity to supply large projects
- **5 commercial offices** including local technical support capabilities
- **One French based R&D Center and High Voltage Laboratory**

France	Head office
	Sales office
	Technical Assistance
	R&D Center
	Testing facilities
	Warehousing
Canada	Sales office
	Technical Assistance
	Warehousing
USA	Sales office
	Technical Assistance
	Manufacturing plant
	Testing facilities
	Warehousing
Italy	Manufacturing plant
	Testing facilities
	Warehousing
Brazil	Sales office
	Technical Assistance
	Warehousing
China	Sales office
	Technical Assistance
	Manufacturing plants
	Testing facilities
	Warehousing



Center of Expertise

70 years of innovation and customer technical assistance

Our R&D Center directs a network of scientists and technical experts -

including Research laboratories and regional teams and testing laboratories around the world.

Sediver testing facilities are amongst the most advanced high voltage laboratories worldwide, with accreditation recognized by more than 70 organisms in over 50 countries around the world.

By continuously developing **innovative new technologies** and improving existing ones,

Sediver aims to provide products and services that add value for our customers.

1. Sediver Italy key facts & figures

Start of manufacturing:	2017
Total area of plant:	16.25 acres
Covered area of plant:	75000 sqft
Total employees:	38
Management and engineering staff:	6
Location: Legal address:	**Sediver USA, Inc.** One Sediver Way, West Memphis AR 72301 – USA T.: +1 870 394 7495
Manufacturing profile:	Toughened glass insulators for distribution high and extra high voltage electric power transmission lines
Organization and quality assurance:	ISO 9001 Qualified by more than 100 US customers since 2017

2. Presentation of Sediver USA

Sediver has had a long presence in the United States.

As early as 1966, Sediver developed an industrial footprint in the US by first settling down in New Jersey and later in South Carolina.

In 2017, Sediver relocated to the US with a brand-new state-of-the-art **manufacturing plant and a Technical Center of Expertise based in West Memphis**, Arkansas.

Since then, many investments and improvements have been made in **West Memphis factory to homogenize the manufacturing processes using the same technological knowledge and developments implemented in the other insulator factories of the Sediver brand.**

Since then, the technical leadership of Sediver has been monitored by the centralized Sediver Product Technology and Quality Assurance departments.

Aiming at standardizing all the toughened glass insulator factories of the group,

Sediver has also implemented its own internal Quality Control procedures in Nusco.

We have been serving nearly all major American utilities from coast to coast with over **17 million Sediver toughened glass insulators** in service which contribute to the service dependability of over 10,000 circuit miles of high voltage lines up to 500 kV.

3. Extensive manufacturing capacity for short lead time

West Memphis is specialized in the manufacturing of toughened glass insulators and is equiped with 1 **assembly line**. All the glass shell used in the manufacturing of our insulators have been produced in our **Nusco (Italy) and Shanghai (China) factories.**

Wide product range

A solution for all needs

Suspension and tension insulators for transmission and distribution lines (from 15 up to 1,000 KV) with mechanical load from **40 kN** to **840 kN** in both standard and fog type profiles as well as open profile for desert environment

4. Sediver stringent quality charter

Quality at every stage of product manufacturing

Sediver's products have outstanding performance and reliability which come from our unique technical expertise, exclusive manufacturing processes and stringent quality requirements.

All our manufacturing plants are ISO 9001 certified and are governed by the same Quality Assurance program and organization. This ensures that all Sediver insulators are manufactured following the same methods and procedures, in order to supply all customers worldwide with insulators of the same quality.

Proven quality – more than a standardized insulator

The design of Sediver insulators is not limited to complying with the minimum applicable standard requirements, but is based on internal requirements for a higher level of performance in service which in turn reduces the operating cost of the line:

- Stringent requirements are used throughout Sediver factories
- Sediver products are best in class in operation
- Sediver quality is proven by numerous performance certificates issued by utilities worldwide

5. Sediver unique manufacturing processes

5.1 Glass shell production

Sediver glass is obtained through a unique melting process based on the use of a specific furnace technology and proprietary Sediver manufacturing process control and parameters.

Sediver technology ensures an outstanding homogeneity of the glass and provides high purity glass without heterogeneity and inclusions.

The glass shells production processes are standardized across Sediver group to comply with Sediver stringent quality requirements. The production steps are described below:

a) Glass batch composition, an automated process

Homogeneity of chemical composition for sustained quality:

An automatic, computer controlled stocking and mixing system is used to weigh-out and mix the raw materials. The weighing tolerances are such that the chemical composition of the glass is perfectly constant and in conformity to internal specification.

b) Melting of raw material, a computerized control command system

Nusco factory has one furnace and two lines of production with a capacity of 16,500 tons of glass per year, with the following process:

Sediver state of the art computerized control command system is dedicated to the constant supervision of the furnace.

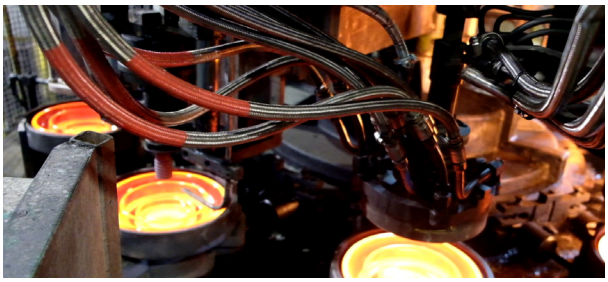
There is no direct human intervention from the stockpiling of the raw materials up to the visual inspection before assembling the insulators.

The continuous process guarantees the homogeneity of the chemical composition of the insulating material.

Thanks to the design of close to 20 furnaces over the years, significant technical improvements have been made and an unequalled know-how was gained over key operations aspects – glass flow, temperature, speed, flame – which has enabled us to **considerably optimize the purity of our glass**.

c) Moulding

A feeder delivers the necessary quantity of glass in a mold. Critical controls are carried out on the glass gob to ensure a consistent viscosity and temperature.



Automated pressing machine enables us to create complex glass shells.

d) Toughening

A toughening machine submits the glass shells to a rapid superficial cooling by blowing compressed air jets. The permanent compressive pre-stresses created on the surface of the glass shells increase considerably the mechanical resistance of the material. This operation will prevent the material from aging.

e) Sediver specific screening process

For extremely high quality

Thermal treatment: after the toughening process, all the dielectric parts are submitted to series of thermal shocks in order to eliminate the glass shells which could present some defects:

Thermal shocks cold to hot and hot to cold on 100% of the glass shell to eliminate those with defects. On top of this thermal treatment, Sediver designed some specific equipment that allows us to guarantee an extra low shattering rate of insulators on line.

f) Visual inspection

Visual examination of **100% of the glass shells**.

5.2 Assembly of the insulators

Nusco (Italy) and Shanghai (China) provide glass shell to West Memphis (AK - USA) assembly plant.

All the manufacturing processes and the control of parameters are executed in accordance with Sediver quality standards and internal specifications.

a) Components rigorous selection

To ensure that incoming caps, pins and cement meet with Sediver requested internal requirements, they are subjected to a rigorous quality control upon their reception at the factory and all along the manufacturing process.

Sediver regularly audits its suppliers all along the entire supply chain to guarantee top quality components.

b) Hot mortar curing for consistent properties & behavior

The assembly of Sediver glass insulators is done by a specific hot curing process, using high strength mortar developped and patented by Sediver.

This chemically inert mortar confers outstanding mechanical stability over time and residual mechanical strength close to that of a complete insulator if dielectric shell happens to be damaged.

c) An extremely precise assembly process

The process includes:

- Preparation of the caps and pins with varnish
- Precise weighting of the aluminous cement and water before mixing
- Assembly operation is done under high frequency vibrations
- Curing of the cement in hot water
- Placement of the cotter key

5.3 Routine Test

After assembly, routine tests are performed on 100% of the insulators including the following tests:

- Cleanliness
- Mechanical load
- Spacing tolerance
- Insertion of cotter key

5.4 Sediver stringent final inspection

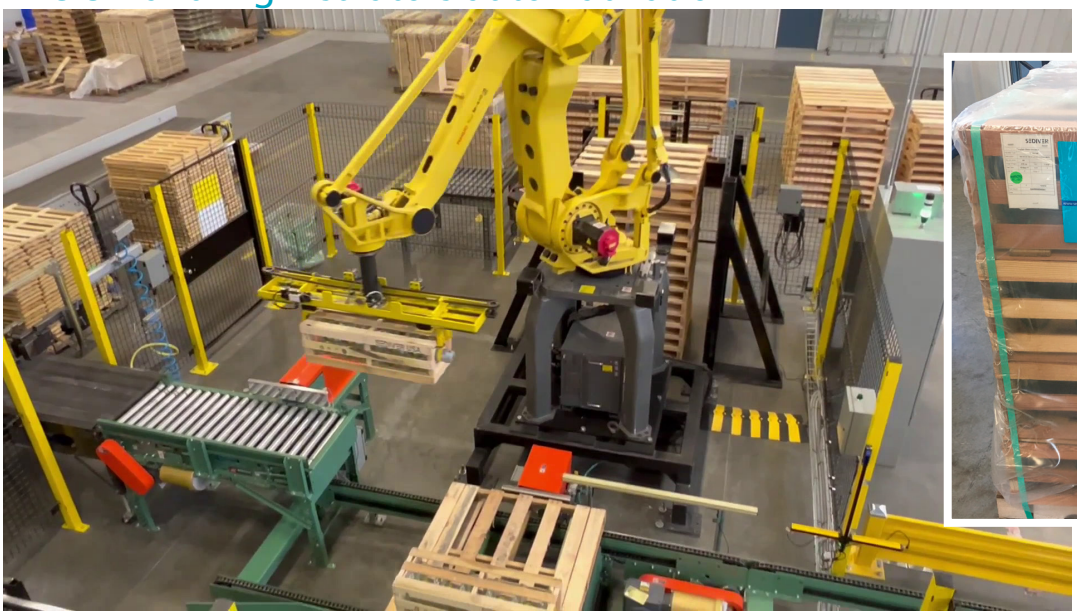
Besides the routine tests, the **Quality Control department** is also conducting sample inspection checks during the entire production process.

These tests will ensure the homogeneity of the manufacturing lots and the compliance of the finished products with Sediver internal stringent quality standards.

After QC acceptance, the insulators are packed, strapped onto pallets and stored.

Sample tests are performed in our laboratory according to customers specifications before the insulators are shipped to customers.

5.5 Handling insulators automatization



At the end of 2021, our plant in West Mamphis, implemented packing robot aiming at automatically palletization of insulators strings crates

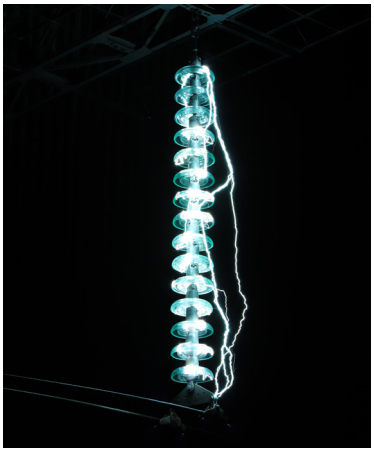
Our main objective is to improve the safety within the workshop and make the handling of the insulators more accurate and delicate by improving the ergonomic for operators.

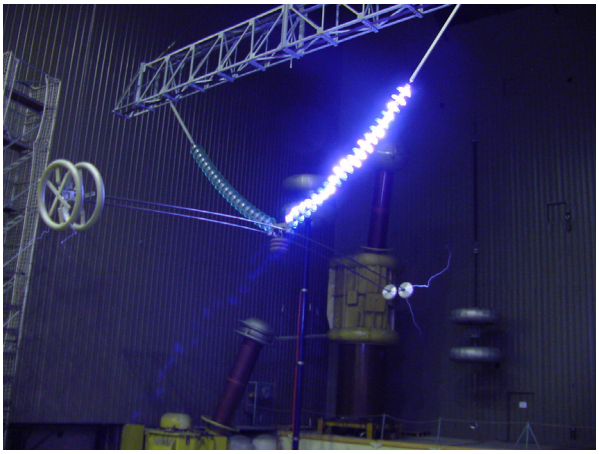
6. Sediver state-of-the-art testing facilities

West Memphis factory - like all other factories of the group – benefit from both Sediver R&D facilities which are located in France and from their own testing equipment.

6.1 Sediver R&D testing equipment

Equipment designation by type test	Purpose of the tests
Materials testing equipment	Verification of behavior under environmental and service stresses
Mechanical testing equipment	Analysis of insulator behavior under extreme mechanical stresses up to 1,000 kN
Mechanical endurance testing equipment	Endurance and accelerated ageing test: cyclic mechanical load, vibrations, thermomechanical test with temperature changes from -60°C +100°C
Electrical test equipment	Full string test up to 800 kV line equipment Power frequency flashover up to 1,150kV, Lighting impulse flashover up to 3,500 kV, Corona & radio interference level on complete strings Resistance to steep front of wave voltage impulse 2,500 to 5,000 kV/µs
Pollution test equipment	Testing insulator strings under artificial pollution: AC salt fog 250 kV, AC solid layer 250 kV and DC salt fog 320 kV, DC solid layer 320 kV

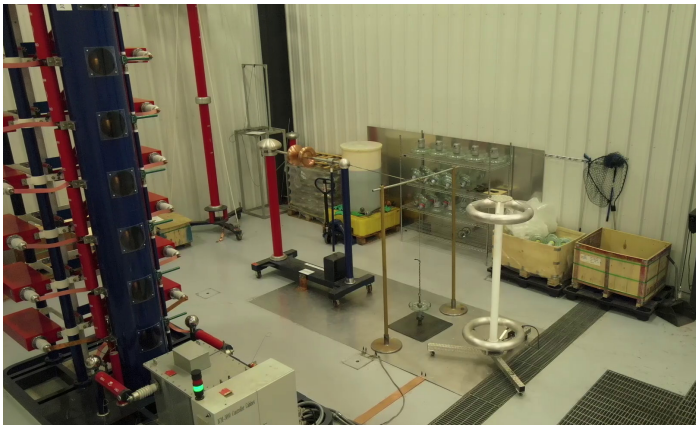


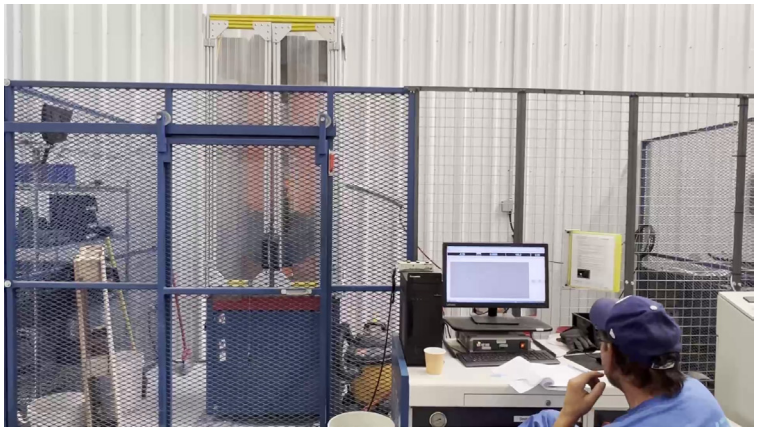


6.2 West Memphis plant main testing equipment

All equipment needed to perform type and sample tests according to national and international standards like IEC, ANSI, BS, Canadian standard are available in West Memphis factory's laboratory.

Equipment designation by type test	Purpose of the tests
Mechanical testing equipment	Analysis of insulator behavior under extreme mechanical stresses up to 1,000 kN
Mechanical endurance testing equipment	Thermal mechanical endurance test chambers with temperature range from -60°C to +60°C
Electrical test equipment	1,350 kV / 67 kJ impulse generator 250 kV / 50 kV power frequency transformer 300kV /70 kV: D.C. dielectric tests RIV test equipment from 50 kV Steep front impulse test: 500 kV / up to 5000 kV/µs Lightning impulse test (1,2 / 50 µs - Ansi C29.1 and IEC 60383): 900 kV Power frequency tests : dry and wet tests: 240 kV
Puncture test equipment	Oil tank for test up to 200 kV Steep front of wave generator





7. Certifications

Today, West Memphis factory is certified ISO 9001. This certificate has been issued by SGS.

bsi.

By Royal Charter

Certificate of Registration

QUALITY MANAGEMENT SYSTEM - ISO 9001:2015

This is to certify that:

Sediver
1 Sediver Way
West Memphis
Arkansas
72301
USA

Holds Certificate No: **FM 683678**

and operates a Quality Management System which complies with the requirements of ISO 9001:2015 for the following scope:

Assembly, testing and distribution of toughen glass insulators for the power distribution industry.

For and on behalf of BSI:

Carlos Pitanga, SVP, System Certification and Compliance

Original Registration Date: 2018-02-21
Latest Revision Date: 2018-02-21

Effective Date: 2018-02-21
Expiry Date: 2021-02-20

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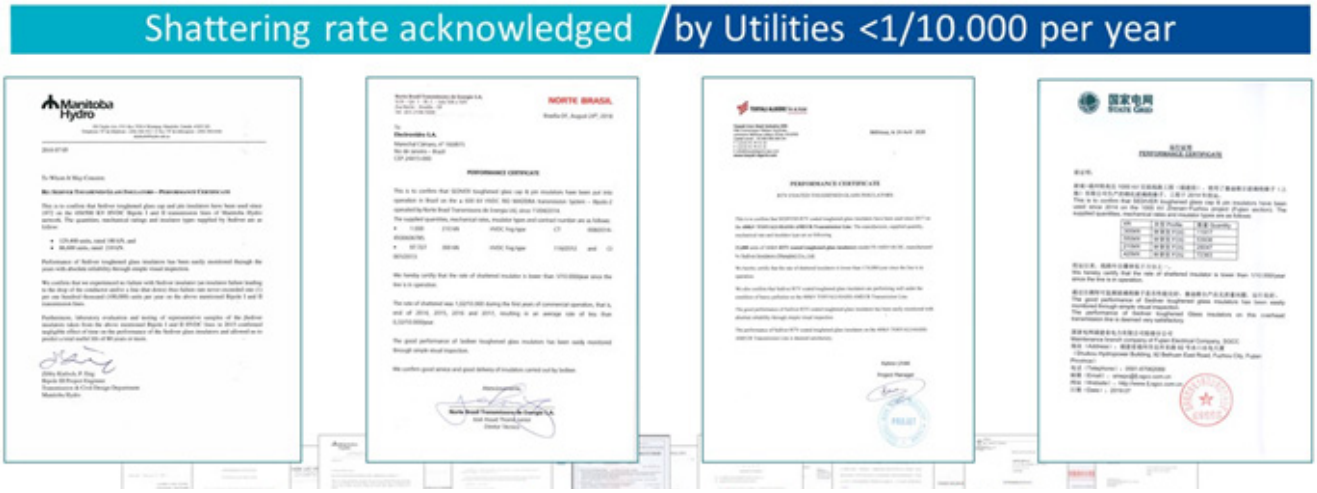
...making excellence a habit."

This certificate remains the property of BSI and shall be returned immediately upon request.
An electronic certificate can be authenticated online. Printed copies can be validated at www.bsigroup.com/ClientDirectory
To be read in conjunction with the scope above or the attached appendix.
Information and Contact: BSI, Kitemark Court, Davy Avenue, Knowlhill, Milton Keynes MK5 8PP. Tel: + 44 345 080 9000
BSI Assurance UK Limited, registered in England under number 7805321 at 389 Chiswick High Road, London W4 4AL, UK.
A Member of the BSI Group of Companies.

8. Proven outstanding quality



Performance certificates of satisfaction issued by Utilities worldwide.

Notes

Notes

Sediver USA, Inc.

Sales service

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