



A LEADING SUPPLIER OF INSULATORS  
AND CERAMIC COMPONENTS

**NTP Products** manufacture and supply insulators for environmental solutions and the energy industry.

This handbook is intended to give a presentation of NTP Products and our capability.

We hope you will find it useful and that you will contact us if you have any questions or requirements.



● *NTP Products global representation*





# TABLE OF CONTENTS

INTRODUCTION	6
INSULATORS FOR ELECTROSTATIC PRECIPITATOR (ESP)	11
OVERHEAD LINE INSULATORS	15
Composite Insulators	16
Ceramic Insulators	17
POST INSULATORS	19
Ceramic Insulators	20
Composite Insulators	21
Resin Insulators	22
CERAMIC HOLLOW INSULATORS	25
AIRCRAFT WARNING SPHERES	29
TOUGHENED GLASS SUSPENSION INSULATORS	33
OTHER PRODUCTS AND SERVICES	37



# INTRODUCTION

## OUR HISTORY

Since the establishment in 1916, the company has developed to its current position as one of the leading suppliers of technical ceramics. Our customers have shown us a trust that has contributed to the development of NTP Products.

We are a leading national supplier with a substantial and high export share. Our strengths are competence, product range and quality, adaptability.

## COMPETENCE AND QUALITY

The combination of our leading-edge competence and motivated co-workers ensures quality in our services and products.

Our insulators constitute the back-bone in all high-voltage systems. The society of today, and tomorrow, is increasingly more dependent on a stable and secure electricity supply.



### ENVIRONMENTAL FOCUS

We have developed insulators for environmental solutions, which are critical components in such installations. Air pollution is a huge global problem, and the demand for these products is increasing.

It is our ambition to grow even more globally and become one of the leading manufacturers within this field of environmental products. Together with our existing, and new customers we will build lasting relations.

### PRODUCTS WE OFFER

NTP Products operates in several market segments and supplies insulators in ceramic, glass, epoxy-resin and composite materials for low, medium and high voltage applications worldwide.

We also supply Warning Spheres for overhead power lines and other utility products on demand.



## LOCATION AND FACILITIES

NTP Products is located in Fredrikstad Norway with a good infrastructure, well located for transportation of our products to various destinations by sea, land or air transport.

## BUSINESS IDEA AND VISION

Our goal is to be the leader in the markets in which we choose to compete.

Our customers shall select us as their preferred supplier and flexible co-operating partner.

## WE FOCUS ON:

- The future
- The environment
- Utilizing the resources

Our products contribute globally to cleaner air and more stable electricity supply.



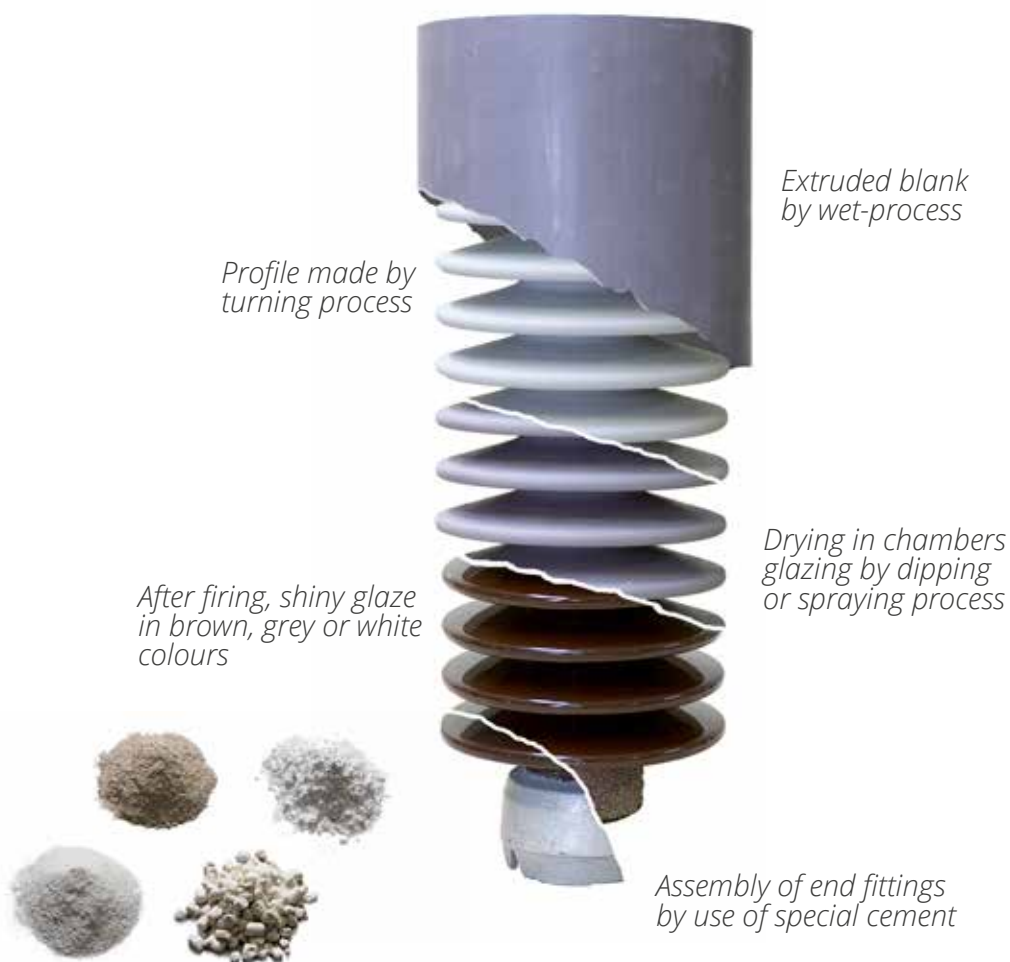


## QUALITY

Our Quality Management System is ISO 9001.

We believe quality is the ongoing process of building and sustaining relationships by assessing, anticipating, and fulfilling stated and implied needs. This philosophy is applied in all steps in

our process, from how we respond to requests, to how we follow up our customers. This company's long experience and leading-edge competence, and positive references, assures a positive contribution to our customer's profitability.







# INSULATORS FOR ELECTROSTATIC PRECIPITATOR (ESP)

NTP Products manufactures and supplies worldwide, insulators for electrostatic precipitators (ESP). These insulators are made of a specially ceramic material developed to operate at temperatures up to 400°C in a DC field and at voltages of 50kV – 150kV DC typically.

## THE ESP - HOW DOES IT WORK?

Electrostatic precipitators use electrostatic forces to separate dust particles from exhaust gases in industrial processes. A number of high-voltage negative charged direct-current discharge electrodes are placed between positive charged collecting electrodes. The contaminated gas passes through the passage between the collecting electrodes, and the particles become negative charged and adhere to the collection electrodes. Cylindrical or conical support insulators are used for the suspension of the collecting electrodes and to provide insulation to the ESP housing.

Rapper insulators are used to remove the accumulated dust on the collecting electrodes by hammer rapping (Dry type ESP) into a hopper below the electrodes. The rapper insulators provide insulation to the hammer rapping motor while the mechanical force is transferred.

## TYPICAL TECHNICAL FEATURES ARE:

- High resistivity at elevated temperatures, i.e. very good insulating ability at high temperatures and direct-current reduces the possibility for electrical breakdown caused by leakage current through the material.
- High resistance to thermal shock and low thermal expansion allow the insulators to resist cracking.
- Excellent mechanical strength and impact strength reduces failure due to mechanical stress.
- Glazed surface reduces the deposit of dirt and dust.
- Suitable for electrostatic dust precipitators working continuously in temperatures up to 400 °C under DC stress.



Alternatively, water spray (Wet type ESP) can also be used to remove the dust from the electrodes. The dust in the hopper is then discharged and transported by ash handling system.

### THE ESP - WHERE IS IT USED?

Electrostatic precipitators are used in the power industry like coal or oil fired power plants, in industries for other exhaust gas particles such as cement works (dust), pulp & paper (salt cake & lime dust), petrochemicals (sulphuric acid mist), iron and steel works (dust & fumes), gas industry, refuse incinerator, aluminium refining and glass industry. Electrostatic precipitators are used successfully for the removal of dust from flue gases. At temperatures below 150°C, traditional electrical porcelain ensures satisfactory operation provided the insulators are kept clean.

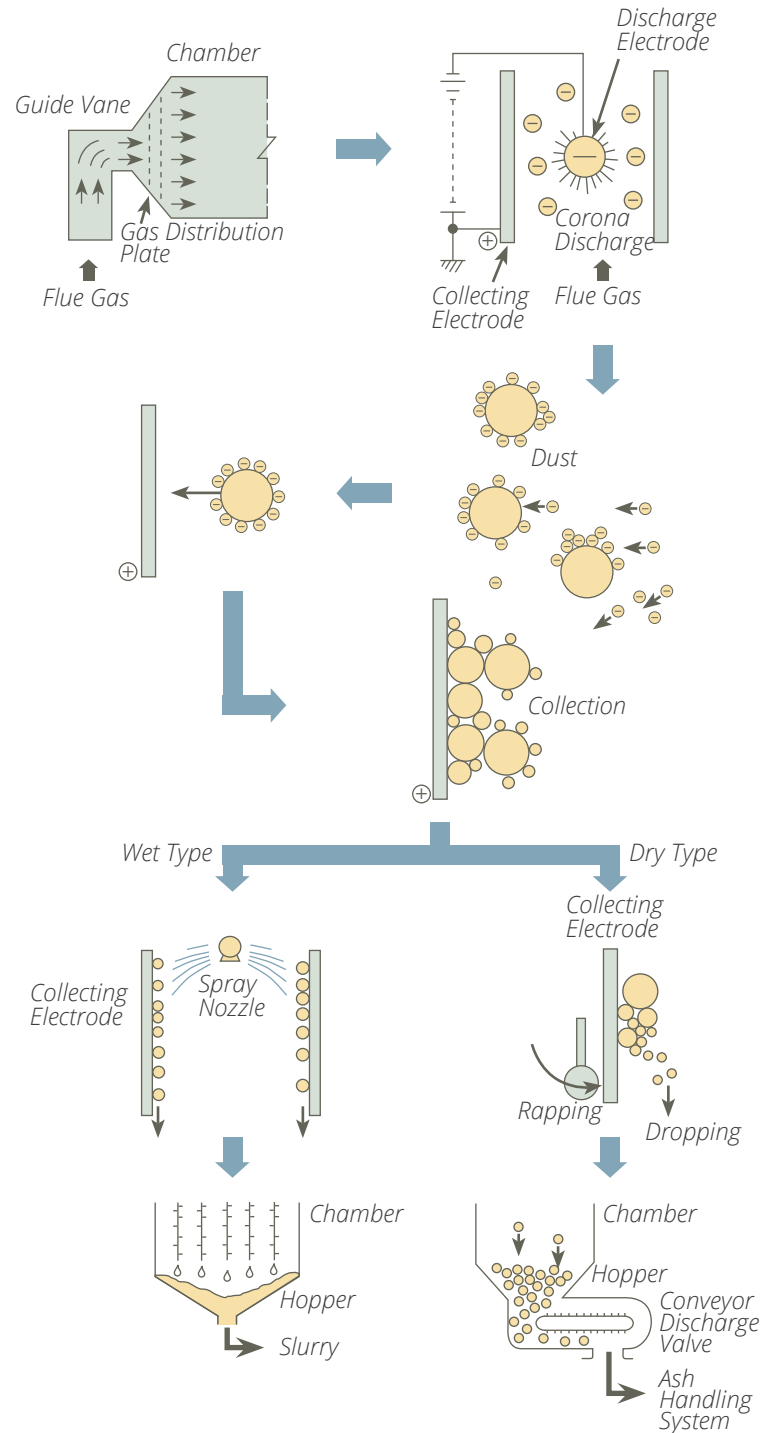
### WHAT TO KNOW

In flue gases conductive particles may precipitate (settle) on the insulator surface. Leakage currents may then start flowing along the surface, causing local heating of the insulator. The resistivity of traditional electrical porcelain is very high at room temperatures, but falls rapidly with increasing temperatures. Above 150°C a strong DC-field will therefore result in a leakage current in the material. This will lead to further temperature rise, and eventually to the breakdown of the insulator.

### OUR MATERIAL

Some precipitators shall operate at temperatures in the region of 150-400°C. NTP Products has developed a material 51A especially for heavy duty performance in demanding operating environments such as for electrostatic precipitators (ESP). The material is excellent for use at high temperatures in direct-current applications because of high volume resistivity and high content of aluminium oxide. Compared to normal electric porcelain the 51A material reduces strongly the ionic migration at high temperatures and DC stress. The material is available either glazed or unglazed, but we recommend glazed surface for all precipitator applications. The glaze has the same properties as the 51A body itself, i.e. no difference in volume resistivity. The 51A material has since many years been used by well-known companies in the ESP-industry worldwide.





NTP Products manufacture and supply Cylindrical and Conical Support Insulators, Rapper Insulators, Bushing Insulators and a wide selection of other insulator types for Electrostatic Precipitators.

Contact us for more details and information.





## OVERHEAD LINE INSULATORS

Overhead line insulators are used for transmission and distribution lines and electrical traction lines. The design may be different for each application and the product range is wide depending on the dimensional, mechanical and electrical requirements.

Typical insulator types in this category are guy-strain insulators, pin type insulators, composite line post insulators, long-rod insulators for tension and suspension and glass suspension insulators. Other types may be Insulators for electrical traction lines such as for railways. Materials may be porcelain or composite.



### TYPICAL TECHNICAL FEATURES ARE:

Porcelain Pin and Line-Post Insulators, Guy Strain and Schackel Insulators for different applications and voltages.

Composite Line-Post and Post Insulators for distribution lines and Railway Catenary systems. Silicone sheds and aluminium end fittings.





### COMPOSITE INSULATORS

Line post composite insulator designs for 12-36kV are all made of glass fibre rod with HTV silicone housing and forged aluminium end fittings. We have a wide selection of types for different applications.

The insulators come with a base pin fitting or flange fitting and top fitting for conductor ties or clamps or flange.

For this product category, we have developed a special top-clamp with “built-in” wheels for easy stringing of conductors. The clamp adopts most of the standard conductor sizes for distribution lines and is designed for live line working as well.

Composite railway insulators for catenary systems. Cantilever and tension types, all with forged aluminium end fittings special designed for catenary systems. Other composite line post Insulators on demand. Composite suspension Insulators on demand.

All composite insulator types are tested according to the relevant standard for each product category.



## CERAMIC INSULATORS FOR DISTRIBUTION LINES

Materials according to C110 - Siliceous porcelain or C120 - Alumina porcelain

Glaze colours: Brown RAL 8017 or ANSI 70 grey

Pin insulators 12-36kV – NTP standard types.

12,5kN bending strength.

Tie-top head of insulator with semi-conductive glaze.

Fitted with zinc thimble for 1" pin threads.

Insulators to other standards on demand.

Guy-strain Insulators

Several sizes for 10 – 12mm wire dimensions.

Mechanical strength from 65kN -140kN

Line post insulators

Insulators to IEC or ANSI Standard.

Pin and schackel insulators for low voltage lines.

All insulators are tested according to the relevant standard for each product category.

Contact us for more details and information.







## POST INSULATORS

**Post insulators are used as supports for bus-bars in transformer sub-station yards, in switchgear as support for breakers and for capacitor banks.**

These insulators are generally subjected to bending, torsion and compression forces in service. In some cases they may also be used as jumper loop insulators for horizontal, upright or underhung installation. Depending on the installation, we offer several options of end fittings. Designs according to IEC, ANSI, other standards or to customer specification.

Post insulators are made in ceramic material but we also offer insulators in composite material for special applications.

### TYPICAL TECHNICAL FEATURES ARE:

- Solid core and puncture proof design.
- High mechanical strength.
- Made of aluminous oxide ceramic.
- Flexible creepage distance for different pollution levels.
- High self-cleaning surface properties.





## **CERAMIC INSULATORS – OUTDOOR AND INDOOR**

Voltage level 1 – 765kV

Materials according to C120 or C130 - Alumina porcelain.

Glaze colours: Brown RAL 8017 or ANSI 70 grey.

Leakage distance according to IEC 60815 or other special requirements.

Conical or cylindrical designs.

End fittings of hot dip galvanized malleable cast iron or other alloy on demand.

On demand, we offer insulators for higher voltage levels and special requirements.

Insulators are tested according to the relevant standards for the product category.





## COMPOSITE INSULATORS – OUTDOOR AND INDOOR

Composite post insulators 24kV with forged aluminium or galvanized cast iron end flanges. These insulators are used for bus-bars, airswitches or for other special applications.

Composite post insulator 72,5kV  
– 16kN cantilever strength.

Composite post insulator 145kV  
– 8kN cantilever strength.

Other composite post insulators on demand.

Composite insulator types are tested according to the relevant standards for the product category.





## **RESIN INSULATORS – OUTDOOR AND INDOOR**

Insulators in Aromatic (indoor) or Cykloaliphatic (outdoor) epoxy resin.

Post insulators 1-72,5kV and Bushing insulators 12-36kV.

Other types on demand.

Standoff polyester insulators 750V – 8kV.

Other special resin insulators on demand.

Contact us for more details and information.









## CERAMIC HOLLOW INSULATORS

Hollow insulators are used in several kind of applications such as bushings for power transformers, instrument/measuring transformers, wall bushings, circuit breakers, surge arresters and cable terminals to mention some areas of use. The design of the hollow insulators depends on customer requirements and installation in the final equipment. The hollow insulators are supplied with or without flanges made of different materials.



### TYPICAL TECHNICAL FEATURES ARE:

Materials according to C120 or C130 - Alumina porcelain  
Glaze colours are brown RAL 8017 or ANSI 70 grey.

Material of end fittings: Aluminium, hot dip galvanized cast iron or other alloys.

Resistance to high internal pressure loads and bending loads.

Different shed profiles depending on creepage distance requirements.



### CERAMIC HOLLOW INSULATORS

Other types in this category are indoor bushing or outdoor-indoor bushings used for passing through walls. These insulators are assembled with a mid-flange and a conductor passing through the insulator.

Voltage range: 12-52kV.

Materials according to C120 - Alumina porcelain.

Glaze colours are white, brown RAL 8017 or ANSI 70 grey.

Material of fittings: Aluminium, hot dip galvanized cast iron, AISI 304 or other alloys.

Different shed profiles depending on creepage distance requirements.

Insulators are tested according to the relevant standards for the product category.



## EPOXY RESIN INSULATORS – OUTDOOR AND INDOOR

Bus-bar bushing insulators 12-36 kV.

Cable termination resin insulators on demand.

Other special types on demand.

Contact us for more details and information.







## AIRCRAFT WARNING SPHERES

Aircraft warning spheres are used as a visual marking of overhead power lines crossing fjords, valleys, and rivers or generally everywhere there is a need to make power lines visible to aircraft and helicopters. The warning spheres are attached to the shield wires or to phase conductors, always to the wire or conductor having the highest point.

In Norway, regulation "FOR-2014-07-15-980" specify all the details of marking of aviation obstacles.

Warning spheres must be visible in daylight at a distance of minimum 1500 meter from all inflight angles. Specific requirements to dimensions and distance between the warning spheres apply. All warning spheres must have a reflective surface.

NTP Products manufacture and supply Aircraft Warning Spheres according to the Norwegian regulation. Our warning spheres consist of two elliptical shaped spheres of UV and ozone resistant polyethylene material, which are attached to the power line by special conductor clamps of aluminium. Acid proof stainless steel bolts, nuts and washers are used to secure the clamps and the sphere to the line.

### TYPICAL TECHNICAL FEATURES ARE:

- Elliptic design of marker made of fluorised polyethylene with reflective surface.
- Clamp of aluminium alloy in each end.
- Aircraft Warning Spheres comes with armour rods for the specific conductor diameter.





The design, shape and rigidity of the warning spheres prevent acoustic noise and vibration problems for the lifetime of the power line. The elliptical shape also has an ice-breaking function if built-up ice on the conductor should release and slide towards the warning sphere.

Warning spheres from NTP Products have been used in the Norwegian transmission network for more than 45 years.

NTP Products part no. A30060 xx  
(xx = conductor diameter inclusive armour rod)

Colour: Signal orange RAL 2010, UV and ozone resistance.

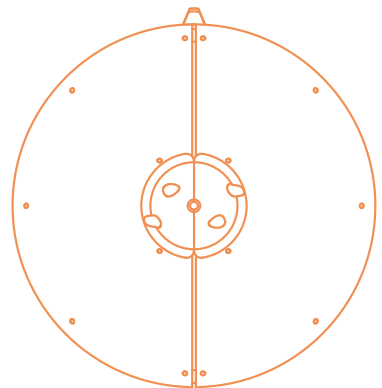
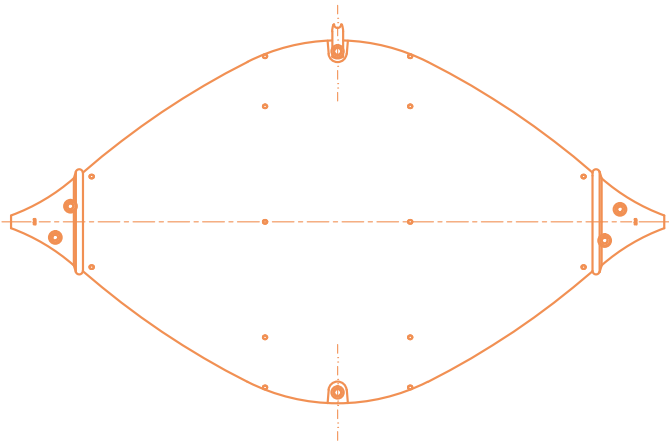
Reflective surface: 3M reflective sheeting  
DG4081 fluorescent/yellow.

Draining holes prevent accumulation  
of moisture/water inside the spheres.

For installation on all type of conductors,  
we recommend to install the warning spheres  
on armour rods.

Dimension of the warning sphere:  
LxW = 1800x1000 mm  
Weight: 45,5kg  
Individually packed: LxWxH=1200x1000x1750  
mm / 75kg in frame and pallet.

Contact us for more details and information.











## TOUGHENED GLASS SUSPENSION INSULATORS

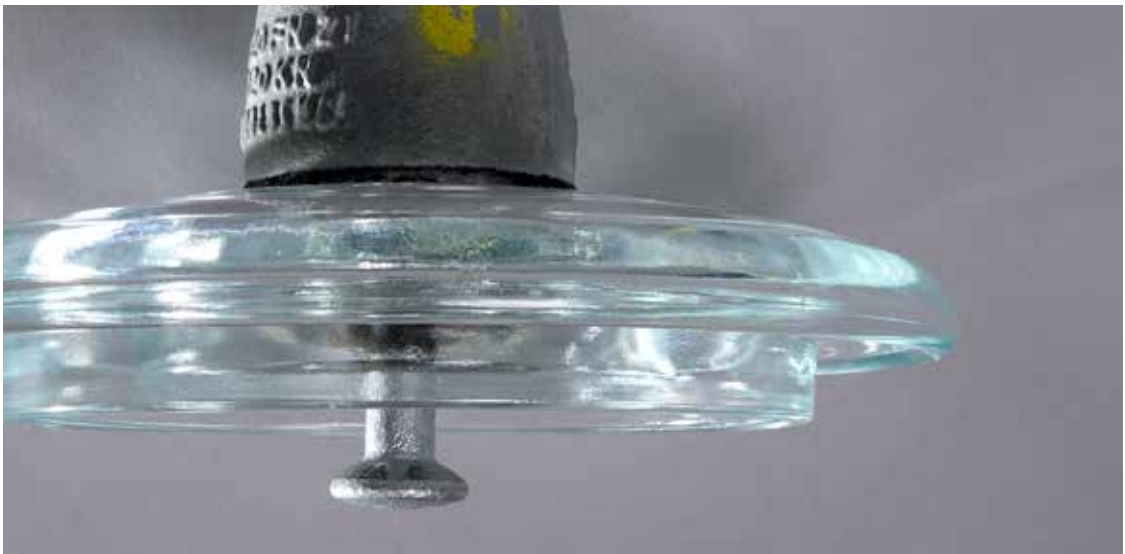
Suspension glass insulators are being used for overhead transmission and distribution lines. NTP Products has since 1961 been representing Sediver in Norway and their product portfolio.

From the start up in 1961 and until 2001 Sediver glass suspension insulators have been assembled by NTP Products in our plant in Norway. More than 14 million units have been supplied from this location. Since 2001, insulators have been made and supplied from Sediver Nusco plant, in Italy. The majority of all glass suspension insulators installed in Norway, come from Sediver and NTP Products.

Together with Sediver, experts and pioneers in glass insulation technology, we offer in-depth technical expertise, innovative products and Sediver technical assistance to our clients.

### TYPICAL TECHNICAL FEATURES ARE:

- Toughened Glass Insulators indefinitely withstand the effects of time and the elements.
- Toughened Glass Insulators have a superior ability to endure mechanical and electrical overload conditions.





## INSULATORS

Applicable standard is IEC but also BS and ANSI Standards are available for AC and DC systems.

Mechanical strength classes from 40kN up to 760kN in several different dielectric shell profiles: Standard profile, fog type profile, open profile, spherical profile and external shed profile.

## CORROSION PREVENTION SOLUTIONS

### Corrosion prevention sleeve:

Pins that are hot-dip galvanized can be equipped with corrosion prevention sleeve made of high purity zinc to prevent pin damage (corrosion) in severely corrosive marine and industrial atmospheres.

### Heavy galvanization:

All ferrous or forged metal parts are hot-dip galvanized to a zinc thickness of 85/86 $\mu$ m.

In severe atmospheres, where this may be insufficient, Sediver offers enhanced protection of the cap and the pin by increasing the zinc thickness to 110 $\mu$ m or up to even 125 $\mu$ m.



### **RTV SILICONE COATED TOUGHENED GLASS INSULATORS [SEDICOAT®]**

Sedicoat® insulators are Sediver in-house coated toughened glass insulators.

Different colours are available for this process and are offered for standard profile, fog profile and open profile dielectric shells from 70kN up to 550kN mechanical strength.

In many cases of extreme pollution, it becomes necessary to wash traditional glass and porcelain insulators in order to reduce the risk of flashover. Some utilities tried composite in such conditions, however field experience clearly demonstrates that the benefit brought by composite insulators is often outweighed by difficulties in diagnostics, inspection and live line working.

The hydrophobic behaviour of the coated surface helps mitigate extreme pollution problems by reducing wetting, dry band activity and leakage currents. This eliminates the need for periodic washing and the risk of polluted related flashovers. Thanks to Sedicoat® solution, the inherent properties of toughened glass such as mechanical and electrical reliability and infallible visual inspection with no risk of puncture, are kept even in extreme pollution areas.

#### **Applications:**

Extremely polluted areas

- > Coastal areas – marine pollution
  - > Extreme industrial pollution areas
  - > Desert or semi-desert conditions
- New lines and refurbishments  
HVAC and HVDC

#### **Main advantages:**

No need of regular washing of insulators

No need to modify line design

Keep the inherent properties of toughened glass

> Infallible visual inspection

> Safe live-line working

> Long-term reliability

A solution confirmed by about 2 decades of satisfactory service.

Sediver Toughened Glass Suspension Insulators are manufactured and tested according to all relevant standards.

Contact us for more details and information.









## OTHER PRODUCTS AND SERVICES

**Different products and applications require different materials, in ceramic or others. NTP Products utilizes a wide range of raw materials and additives to satisfy our customers' different technical specifications.**

In order to have a wide product range, we also employ other different production techniques for diepressing, extrusion of special profiles and slip casting.

Small series production for all product categories are also available.

We can also assist in the supply of complementary products the client may need.

Contact us for more details and information.







We hope this handbook provides you with useful information about us and our products.




It reflects our product portfolio at the time of publication.

If you have any questions or requirements please do not hesitate to contact us.



NTP PRODUCTS AS

Trosvikstranda 46 - 48 | NO-1608 Fredrikstad | Norway

 +47 69 38 30 00 |  [sales@ntp-as.no](mailto:sales@ntp-as.no) |  [www.ntp-as.no](http://www.ntp-as.no)