

DESIGN AND
PRODUCTION
OF COMPOSITE
MATERIALS AND
HIGH VOLTAGE
EQUIPMENT FOR
CHALLENGING
APPLICATIONS
IN STRATEGIC
MARKETS



Via Soncino - 26017 TRESORE CREMASCO (CR) - ITALY
Phone: (+39) 02 90632866 - sales@savercompositi.com
www.savercompositi.com

ABOUT US



SAVER S.p.A. is a company located in Milan, founded in 1980 and operating in the design and production of composite materials, mainly through the filament winding and laminates technology and in High Voltage equipment.

The main applications of products fabricated by SAVER S.p.A. cover the following industries:

- Energy transmission in High Voltage
- Automotive
- Mechanical and Industrial
- Automation
- Railways
- etc...

SAVER S.p.A. fabricates all its products completely in Italy (UE) in its plant located in Trescore Cremasco (CR), making use of the most performing raw materials. In the same plant Saver has installed its High Voltage Laboratory.

SAVER Alumen S.r.l. is a company located in Romania - Tecuci founded in 2012 which deals with the design and production of aluminium castings for several industrial applications and of Glass mat on polyester resin sheet laminates.

SATEK S.r.l. is a company located in Italy - Siziano (PV) which deals with the design and production of electrical insulating materials and electro-mechanic devices for railways industries.



MISSION

The SAVER Group's mission is to preserve its global leadership in the production of advanced composite materials and High Voltage equipment for complex systems of international leaders in their specific strategic markets.



Being a pro-active interlocutor able to meet the customer's requirements on technological development, granting long term competitiveness, absolute reliability and quality of products.

SAVER is compliant with its own ethical code in the creation and management of long term relations with all stakeholders, respecting the individual, laws, environment, the preservation of its own patrimonial and intellectual independence, accurate investment policies for the development of human capital, technologies, products and markets.



KNOW HOW



The success story of our group, the international presence of our products and the fact that we are able to establish partnership with prominent global leaders are all consequences of our competitive advantages:

MORE THAN 40 YEARS' EXPERIENCE IN CONSTANT INNOVATION for composite materials for different industrial applications

PRIVATE AND INDEPENDENTLY OWNED GROUP and this allows for fast decisions, high flexibility, adaptive capabilities and a long term investment view

INTERNAL DESIGN AND SELF-DEVELOPMENT OF INDUSTRIAL PROCESSES to grant maximum performances to the products and customized solutions

THE BEST PERFORMANCES GLOBALLY in terms of Max Glass Transition Temperature, Gas Tightness, PD and low temperatures applications studies.

THE ONLY HOLLOW COMPOSITE INSULATORS MANUFACTURER IN UE with the complete vertical integration of the process and components "house made". Total quality control of the overall processes and best lead time to market.

RELIABILITY OF PROCESS, TOTAL ELECTRONIC TRACEABILITY AND REAL TIME CONTROL

CAPABILITY TO PROPOSE CONCRETE SOLUTIONS WITHIN AGREED DEADLINES to meet specific customer requirements, to industrialize an high automation rate processes for flexible and lean production

SELECTION OF THE BEST AND MOST RECENT MACHINERIES for production, testing and control

SPECIFIC AND VALUABLE VALIDATION CRITERIA OF RELIABLE RAW MATERIALS with best technical performances and long term safe procurement contracts

R&D INTERNAL DIVISION which cooperates with research institutes, international certified laboratories, and Universities as well as customers' R&D divisions and suppliers

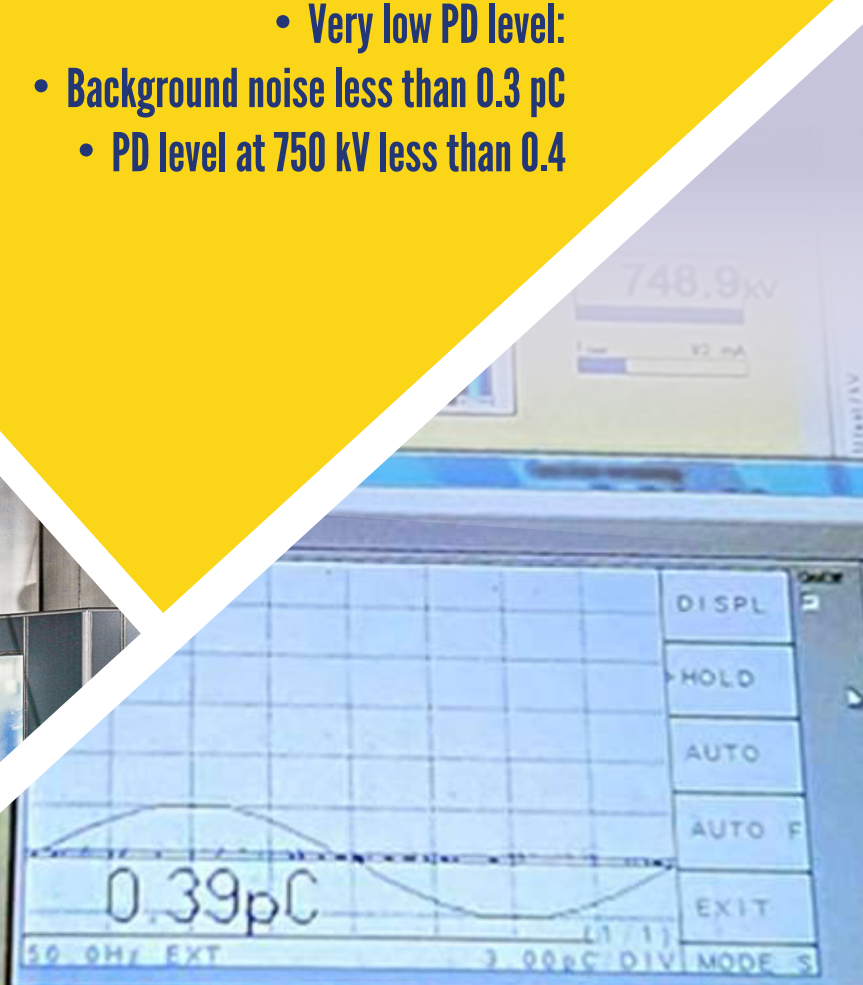
HIGH VOLTAGE LABORATORY 750 KV AC FOR PD DETECTION with outstanding performances in terms of background noise



SAVER HV LABORATORY FOR HV TESTS



- High Voltage Lab set up with AC transformer 750 kV
 - Laboratory tested PD measurement system calibrated
 - SF6 and alternative gases equipment by DILO installed, handling process set-up and certified
 - Tightness measurement system installed
 - Possibility to perform HV tests for third parties equipment – OEMs and Utilities – in our internal HV lab
-
- Very low PD level:
 - Background noise less than 0.3 pC
 - PD level at 750 kV less than 0.4



OUR PORTFOLIO



- Hollow composite insulators for high voltage
- High voltage composite or porcelain bushings
- Dry winding vacuum - impregnated tubes and rods
 - Filament winding tubes
- Bandaging for synchronous servo motors
- Rings for starter motors and commutators
 - Self lubricating composite bearings
- Glass mat on polyester resin sheet laminates
 - Aluminium castings



HOLLOW COMPOSITE INSULATORS FOR HIGH VOLTAGE

www.savercompositi.com/insulators.php



YOUR ADVANTAGES

- Safety for workers and equipment
- Maximum vertical integration of the process
- High hydrophobicity of our best liquid silicone rubber
 - Center of competence for tightness performances
 - Compatibility with alternative clean gases and oils
 - SVTI approval
 - High pollution test
- 5000 hours multi-stress test
 - DC tests
- Minus 60 Celsius degrees test
 - Best short lead time
 - Lower Weight
 - No fragile material
- Better seismic performances
 - Best insulating properties
- Tight dimensional tolerances
- Very low heat transfer coefficient
 - Excellent U.V. resistance
 - Conical and tapered shapes
- Internal acceptability criteria more severe than applicable IEC and IEEE standards
 - Integrated solutions with optical fibers
- Partial discharge measurement in our internal High Voltage Lab
 - Electrical field software simulations available

SAVER insulators have been used for decades all over the world in hundreds of thousands of High Voltage equipment up to 800-1000 kV such as:

- Dead tank breakers
- Live tank breakers
- Surge arresters
- Instrument transformers
- RC dividers
- Cables terminations
- Transformers bushings
- GIS bushings
- Capacitors
- Railways applications
- Special post insulators
- Special applications
- Etc.



HIGH VOLTAGE COMPOSITE OR PORCELAIN BUSHINGS

www.savercompositi.com/bushings.php



YOUR ADVANTAGES

- Robust and Safe Design
- Careful Selection and validation of materials
- Assembly and cleaning line, mechanical pressure and tightness tests
- Electrical simulations and type tests: AC Test and partial discharge detection, BIL, Wet test, Temperature rise test, Cantilever test, Pressure test
- Possibility to witness the high voltage routine test by OEM and Utilities in our HV LAB
- Compatible materials for SF6 and for clean alternative gases
- High voltage routine tests that certify "PD free < 2 pC" Partial Discharge levels
- Execution of certified welding
- Full Electronic traceability
- EU Certificate of origin
- Wide Bushing Portfolio
- SVTI Certifications

Saver is able to manufacture bushings in composite material or porcelain, completely assembled internally and electrically tested in its 750 kV AC High Voltage test laboratory.

Saver grants best gas tightness performances of the bushing, limiting the annual emission of the aforementioned gas into the atmosphere according to internal acceptability criteria much more stringent than those prescribed by the IEC international standards.

Saver has developed, together with its primary customers, composite bushings compatible with clean gases (non-greenhouse gases), which therefore do not require any use of SF6.



DRY WINDING VACUUM IMPREGNATED TUBES AND RODS



www.savercompositi.com/drywinding.php

Dry Filament Winding (polyester, glass, aramid) vacuum-impregnated tubes and rods for electrical equipment designed for voltage ranges between 72,5 and 1000 kV.



Complete elimination of presence of micro vacuoles of air inside the composite

Best adhesion in depth between reinforced fibers and the resin system formulation

Best electrical and mechanical characteristics technically feasible

High experience in bonding process to metal fittings

The winding angle can be chosen for each layer of the winding process, in order to give the composite materials specific mechanical characteristic requested by the customer depending on the application.

YOUR ADVANTAGES

- Research for reduction of overall dimensions of equipment
 - Reduction of the impact on environment of electrical substations
- Benefit of increased properties of composite materials
 - High voltage tests with Partial Discharges measurement in Saver internal high voltage lab
 - Reduction of installation costs

Here below you can find some examples of applications in which our vacuum-impregnated tubes are often used:

- Tubes for grading capacitors;
- Internal insulating parts for HV circuit breakers such as:
 - Drive rods
 - Support insulators
 - Interrupter chambers
 - Gap insulators
 - Capacitors

Feasible lengths, wall thickness and diameters are very flexible and tailor-made solutions can always be evaluated with our customers.



WET FILAMENT WINDING

www.savercompositi.com/filamentwound.php



SOME EXAMPLE OF APPLICATIONS OF OUR FWT ARE:

- Insulating tubes for several electrical equipment in transmission and distribution of electricity (medium and high voltage)
- FWT for electrical sticks for overhead lines for medium and high voltage (safety equipments)
 - FWT for fuses
- FWT for bandages for permanent magnets
- FWT for non-magnetic applications
- FWT for rollers
- FWT for separation of material machines
- FWT and components for thermal insulation
- Self-extinguish FWT for railways applications
 - FWT for nautical applications
- FWT for aeronautical applications
 - Insulating Spacers
- Components for welding torches
- Components for insulated tools
- FWT for reverse osmosis vessels
- Different industrial applications for steel factories, defense, textile machines

The design of the filament wound tube can be customized to obtain the mechanical values requested by the customer considering the specific application.

Epoxy resins with $T_g > 120 \div 130^\circ\text{C}$.

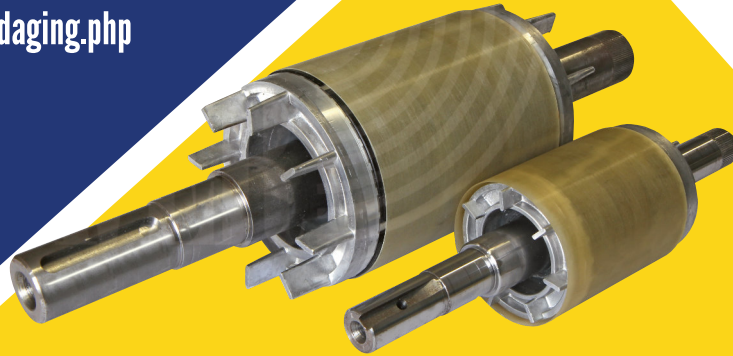
Special resins with $T_g > 300^\circ\text{C}$ for specific applications with special requirements.

Saver S.p.A. is the global leader of production of filament winding tubes (FWT) of glass, polyester and aramidic fibers for electrical and industrial applications. We have resources for developing, producing and selling standard and tailor-made FWT. Our technicians and sales force have many years of experience in composite materials, which allows for efficient collaboration with customers.



BANDAGING FOR SYNCHRONOUS SERVO MOTORS

www.savercompositi.com/bandaging.php

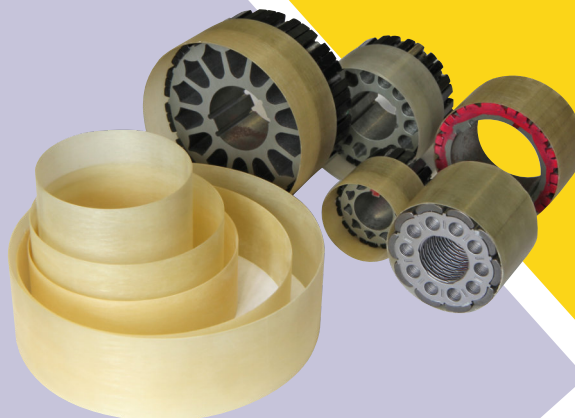


YOUR ADVANTAGES

- Excellent mechanical protection of the brittle magnets during assembly
- Flexible sleeving of the rotor compensating shape deviations
- High performance safety armouring in service
- Very low wall thickness (<0.3 mm) maintaining the motor's effectiveness
- Low specific weight granting minimal impact on mass moment of inertia
- Cost reduction due to reduced number of process steps:
 - no handling of liquid resin
 - no winding
 - no time consuming curing operation
 - no waste management
- faster production cycle and lead time

PROTECTION AGAINST:

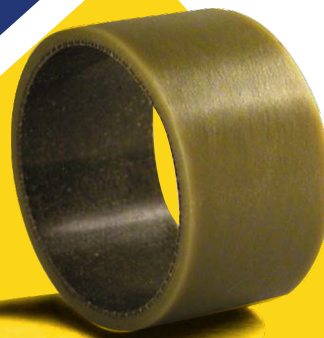
- Loosening and displacement of magnets in service due to vibrations and centrifugal force
- Damages during assembly (insertion of the rotor into the stator).



SELF- LUBRICATING BEARINGS DUROBEARING

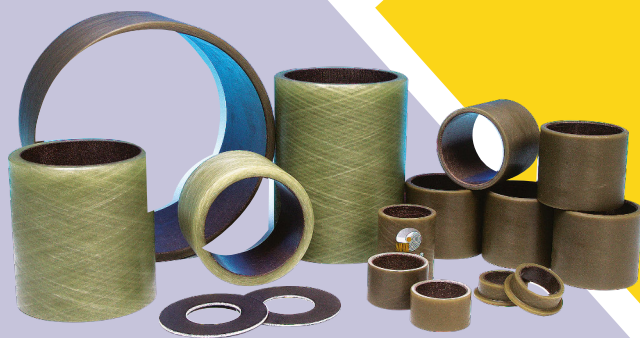
www.savercompositi.com/durobearing.php

Durobearing is an advanced solution for journal bearings composed of high-performance fibers, ideal for high load, low speed applications or where traditional lubrication is difficult, costly, or harmful.



YOUR ADVANTAGES

- Self-lubricating with dry lubrication
- Maintenance-free, eliminating the need for greasing systems
 - Environmentally-friendly and vibration absorption
 - Reduced operating and warranty cost
- Significant reduction of “systems” cost of assembly
 - Operates with a variety of steel shaft materials
 - Extremely low coefficient of friction
 - Static and dynamic coefficients very close, eliminating “stick-slip” behavior
- Dimensional and thermal stability, corrosion and chemical resistant
- Reduced power demand for start-up and running of machinery
 - Non-conductive and non-magnetic
- Low noise chatter and enhanced abrasion resistance
- Highly wear resistant and able to handle high loads

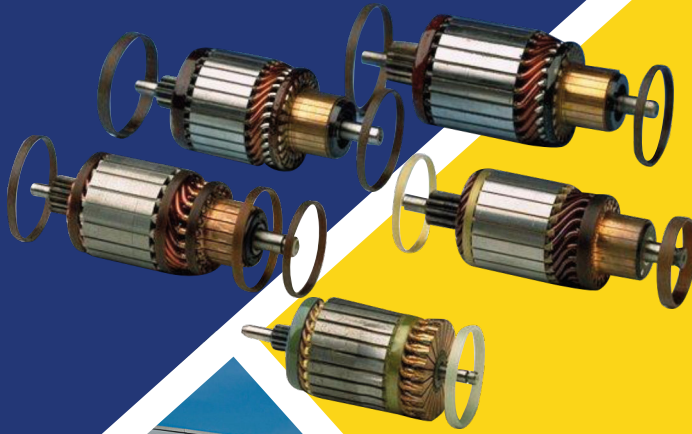


Here are just some of the industry applications for Durobearing: Aerospace, Defense, Medical and Robotics, Marine, Agricultural and Automotive, Refuse Collection Chemical, Food processing and Material Handling, Communications, Energy Installations, Hydraulic and Installations Construction, Forestry, Landscaping, Mining.



RINGS FOR STARTER MOTORS AND COMMUTATORS

www.savercompositi.com/ring.php



Rings for starter motors

Rings for starter motors are used in the automotive industry: lighter components are used to produce lighter cars with lower consumption at a lower price.

Rings for commutators

Rings in insulating composite material have replaced the steel rings inside bar commutators.



YOUR ADVANTAGES

- Electric Insulator
- Non-magnetic bandage
- Completely insulating bandage
- Resistance to centrifugal force
- Resistance to high centrifugal loads
- Compatibility with impregnation resins
- Reduced vibration during engine operation
- No risk of contaminating the motor with metal parts
- Glass transition best performance up to 300 degrees Celsius
- Improved resistance to mechanical stress due to better compatibility with armature impregnation resins



ALUMINIUM CASTINGS

www.savercompositi.com/alumen.php



Saver Alumen S.r.l. is specialized in the production of aluminium castings for several high voltage and industrial applications. The company has an advanced traceability system and is ISO 9001 and SVTI certified.

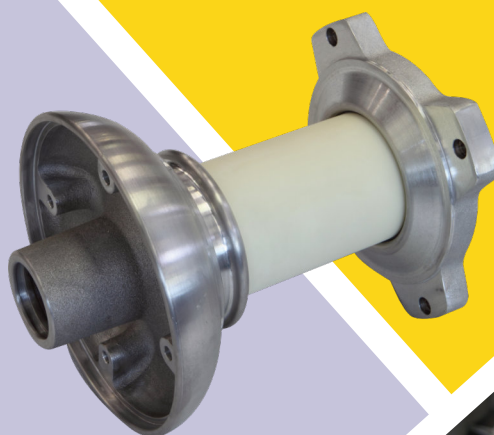


- The implementation of routine x-rays inspections, through the best and most advanced high definition equipment, grants the absence of inclusions and porosity inside the castings.
- These achievements represent a solid basis to grant the severe internal acceptability criteria about long term gas tightness performances.
- The process is completed with internal Thermal Treatment.
- The alloy we mainly use in our process is the ENAC 42100 (AlSi 7), that is the alloy globally accepted and used for insulators and HV equipment.

- SAVER Alumen S.r.l. is the company of our group specialized in the production of aluminium die gravity castings through permanent steel molds.

- The company has an old technical experience in manufacturing castings, analyzing and selecting only the best alloys and raw materials.

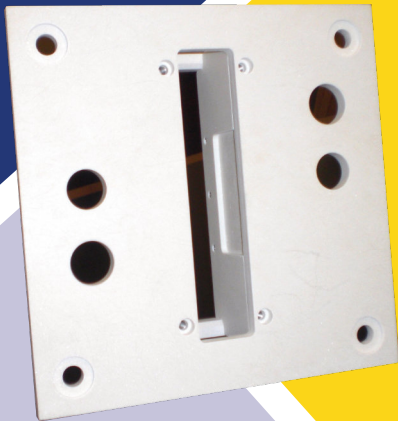
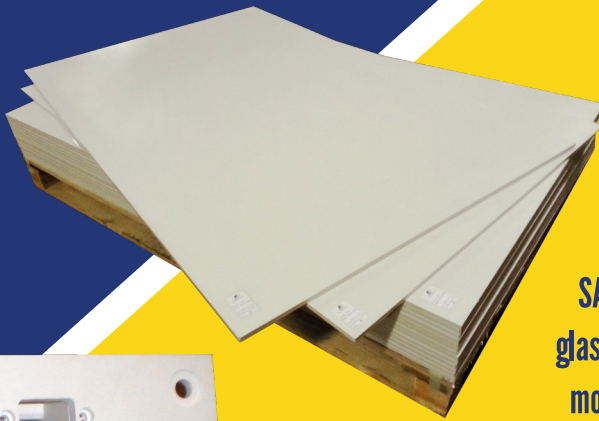
- The overall production process is focused on the constant control of acceptability and traceability criteria needed for gas pressurized castings for High Voltage applications.



GLASS MAT ON POLYESTER RESIN SHEET LAMINATES



www.savercompositi.com/resinsheet.php



Saver Alumen S.r.l. can also produce sheet laminates with much higher mechanical and/or thermal performances compared to standard GPO3 (brand name PL3) for particular applications in presence of specific requirements.

In particular:

- Our materials - PL3 or PL5-HK - are certified according to EN 45545-2 considering requirements for railways application, fulfilling all characteristics in terms of fire behavior and smoke toxicity;
- PL3 - UPGM 203 according to EN 60893, GPO-3 according to Nema and is UL CERTIFIED;
- PL5 - UPGM205 according to EN 60893 with high glass content for high mechanical loads;
- PL5-HK - our special material - for high mechanical load under thermal stress, based on UPGM 205 -thermal class H (180°C);
- PL6 - our special material with very high mechanical resistance under thermal stress.

SAVER Alumen S.r.l. is specialized in the production of glass mat on polyester resin sheet laminates, using the most reliable and performing raw materials available.

Our sizes are the following:

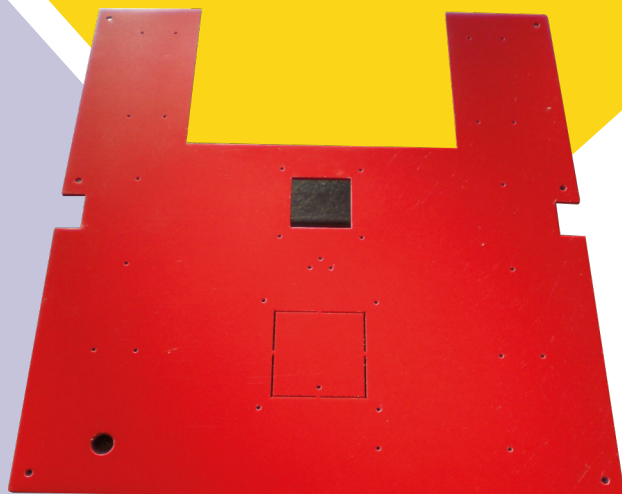
2000 x 1270 mm with thicknesses from 1,0 to 40,0 mm

1265 x 1150 mm with thicknesses from 41,0 mm to 100 mm

Thanks to our technical experience the company is able to grant:

- High and constant levels of control and quality and to keep an internal stock of several thicknesses ready-to-order
- Best lead time
- Best quality and competitiveness

Our materials are UL and EN 45545-2 certified





Registered Office:
Via della Moscova 14
20121 Milano ITALY

Head Office:
Via Soncino
26017 Trescore Cremasco (CR) ITALY
Tel: (+39) 02.90632866
Fax: (+39) 02.90632972
sales@savercompositi.com

savercompositi.com