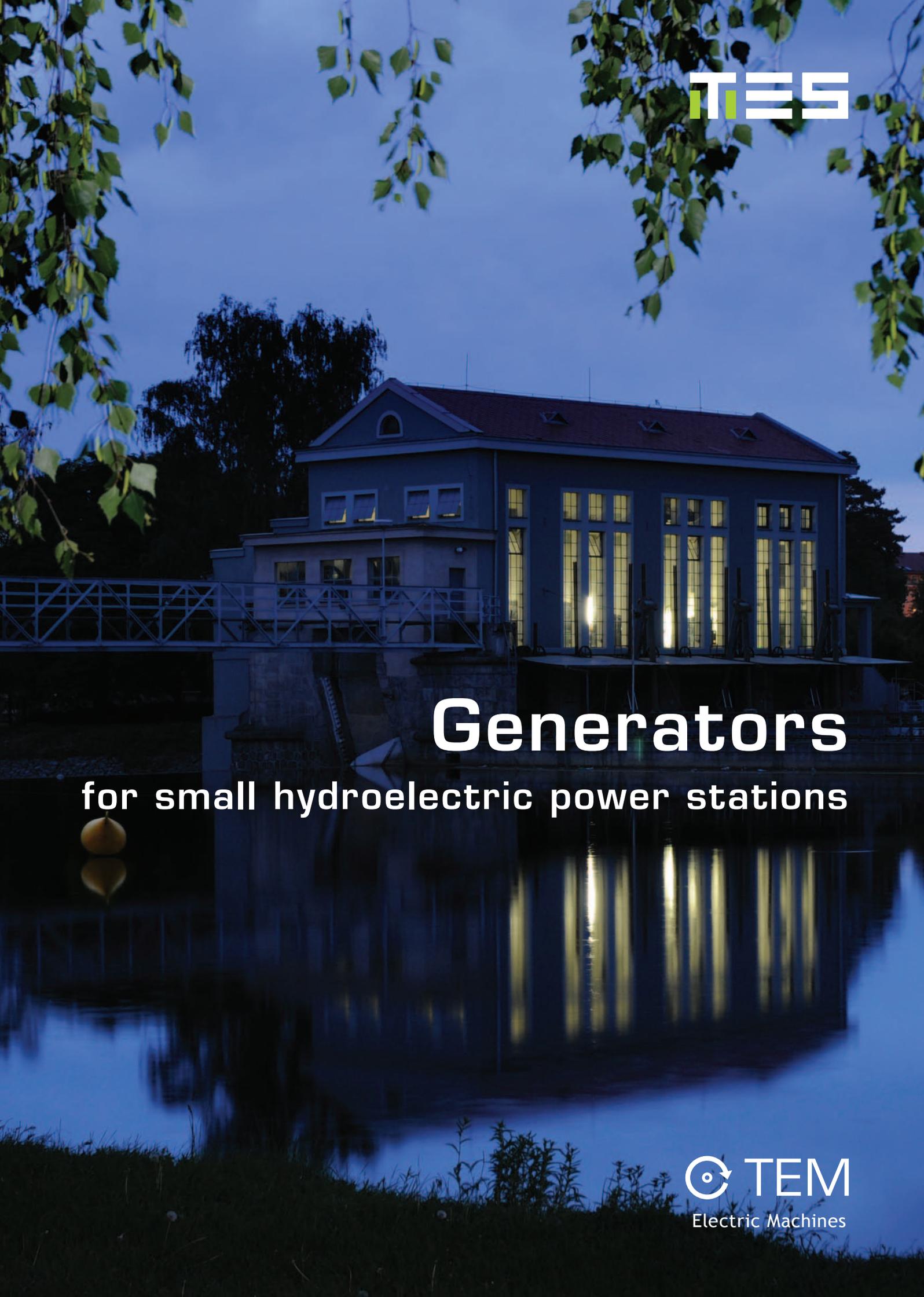


The logo for TES, consisting of the letters 'T', 'E', and 'S' in a stylized, blocky font. The 'T' is white with a green vertical bar on its left side. The 'E' and 'S' are white. The background is a dark blue sky with green leaves hanging from the top corners.

TES

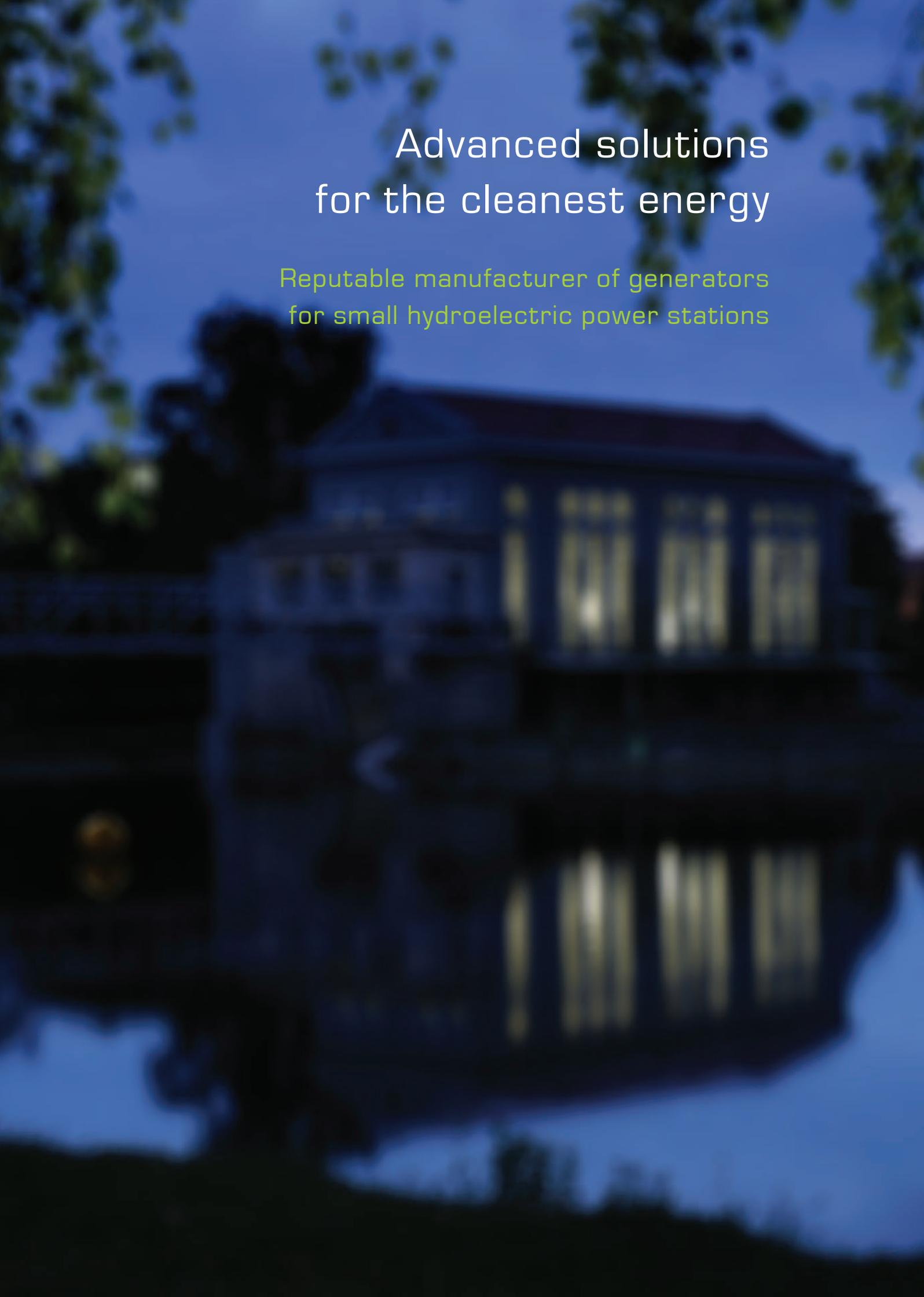
A photograph of a hydroelectric power station at dusk. The building is a two-story structure with a red roof and several large windows that are illuminated from within, casting a warm glow. The building is situated on a concrete structure over a body of water. A metal walkway with railings extends from the left side of the building. The water in the foreground is calm, reflecting the lights from the building and the sky. The overall scene is serene and industrial.

Generators

for small hydroelectric power stations

The logo for TEM Electric Machines. It features a circular icon with a stylized 'T' and 'E' inside, followed by the letters 'TEM' in a bold, sans-serif font. Below 'TEM' is the text 'Electric Machines' in a smaller, lighter font.

TEM
Electric Machines

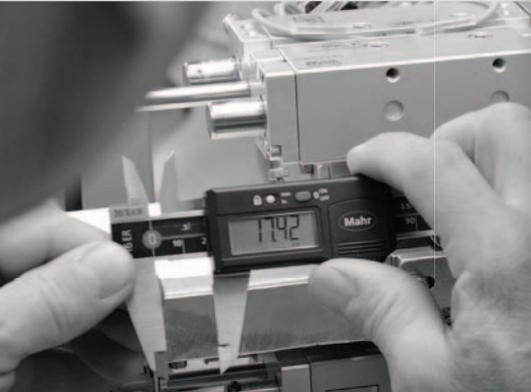


Advanced solutions for the cleanest energy

Reputable manufacturer of generators
for small hydroelectric power stations

**TED**

Electric Drives

**TEM**

Electric Machines

**TEC**

Electric Components



Competence in the field of electric rotating machines for power engineering

High-quality electric rotating machines for renewable power sources as well as traditional power sources. Reliable maintenance service.

A tradition of design and production, as well as international experience

in supplying major international power engineering companies.

Proven technical solutions

An extensive portfolio of standardized types of synchronous and asynchronous generators, as well as customized products to meet our clients' specific requirements.

Expertise and professionalism

of a well-coordinated team founded in our staff's qualifications and experience as well as our focus on working conditions.

Quality is a given

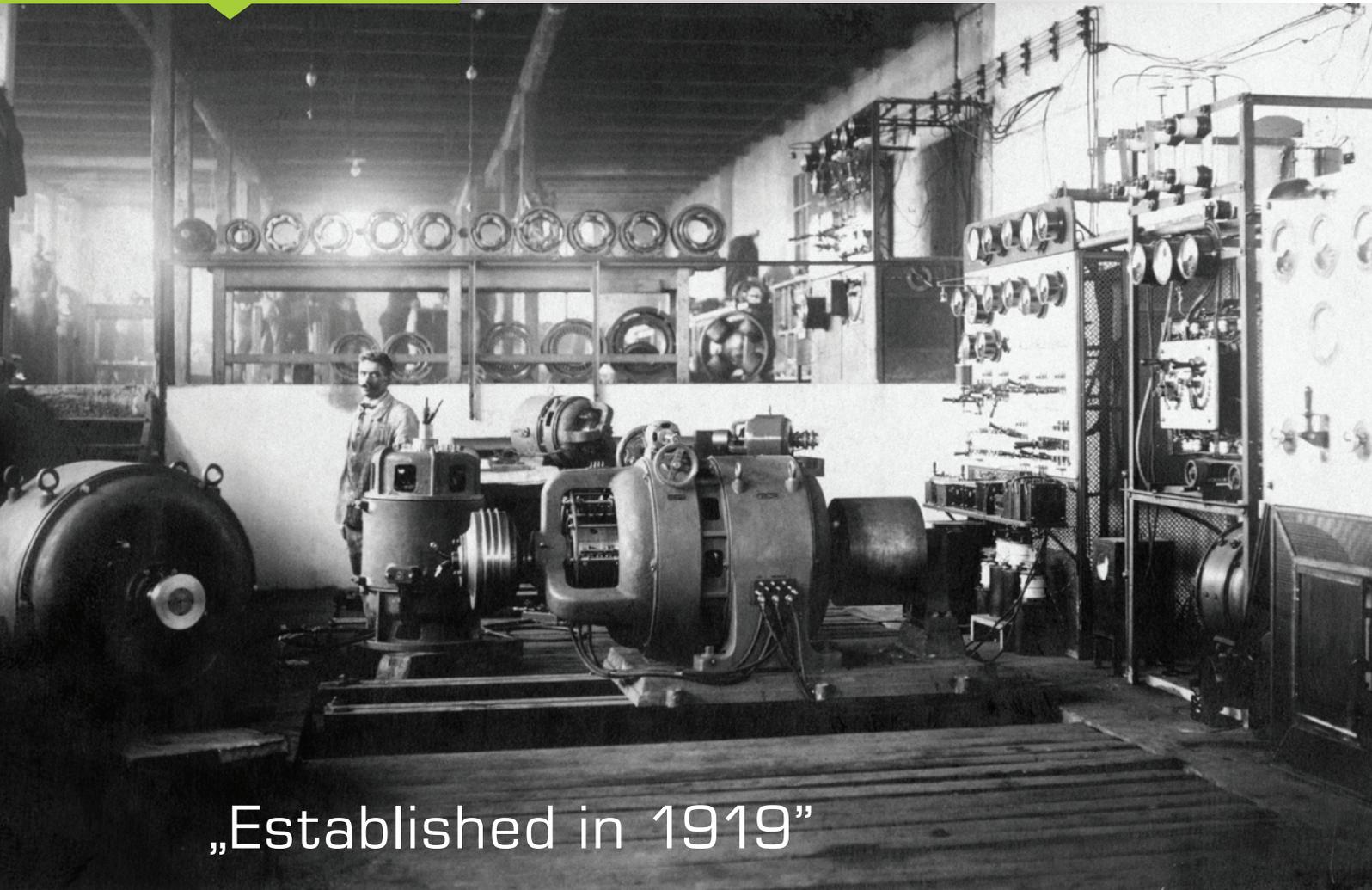
ISO 9001 + ISO 14001, OHSAS 18001, EN ISO 3834-2, EN 15085-2, DIN 18800-7, ČD V95, test methods, audits, and investment in accurate measuring instruments. Stringent quality control of design processes and production processes in accordance with EN standards. Testing according to EN ISO 60034 is complemented by the integration of CSA and NEMA-UL standards.

Continuous improvement

in business processes using applications such as 5S, VSM, TPM, SMED, and other state-of-the-art methods guarantees an efficient use of resources and elimination of waste.

Synergy

We combine autonomy and cooperation within the product-oriented divisional structure of our company. A large assortment of machines and all technologies under one roof.



„Established in 1919”

Many years of generator production for hydropower engineering are reflected in the maturity and experience of the manufacturer.

Innovations in all areas, from the development of the product itself to production processes, as well as our knowledgeable and skilled staff, are a guarantee of sophisticated technical solutions.

The electrical machines, drives and components produced in our plant in Vsetín satisfy the needs of our clients on all continents. Our plant premises cover an area of 100,000 square meters; we have a large assortment of production machinery and nearly 800 employees.

1919-1945

Electrical Engineering
Factory Josef Soušedík



1945-1995

MEZ Vsetín



1995-2011

TES Vsetín
and Mezservis



since 2012

TES Vsetín



„Partner on the way from an idea to own kilowatts”

- ✓ High efficiency and effectiveness in the long term
- ✓ Long product life and high product reliability
- ✓ High technical standards
- ✓ Easy access to parts requiring inspection and maintenance
- ✓ Technical assistance from the design stage to supervision during operation
- Technical cooperation during the course of the entire project
- Customized designs - adaptation of installation dimensions and other technical parameters
- Transport
- Installation, commissioning, assistance during inspection upon receipt
- Warranty service and post-warranty service
- LifeProtect - monitoring the operation of the machine to prevent accidents and damage



Generators for small hydroelectric power stations

The design of our generators is the result of many years of optimization of electromagnetic circuits and our experience with specific requirements of our clients in the field of hydropower engineering. Our product portfolio includes highly efficient synchronous brushless generators up to 30,000 kVA and asynchronous generators up to 1,500 kW, all of our own design. The number of optional designs and accessories allows us to meet all individual client requirements. The exclusive use of high-quality materials and components, as well as the robust construction of our machines, guarantees their long life.

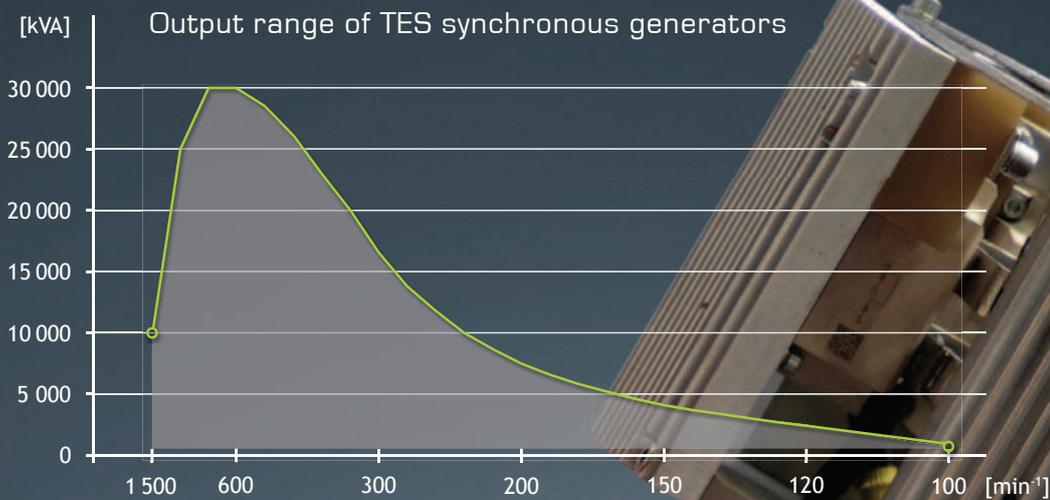
We put great emphasis on our own Research & Development to find timeless technical solutions that ensure the high reliability and efficiency of our products.

The ongoing optimization of electromagnetic designs and our design software, as well as a combination of modular design and location-specific design, gives our clients the following advantages:

- increased efficiency
- extended life
- improved price|performance ratio
- shorter delivery terms



R&D



Synchronous generators

Output range: 200 - 30,000 kVA
 Nominal speed: 100 - 1,500 min⁻¹
 Voltage: 400 - 13,800 V

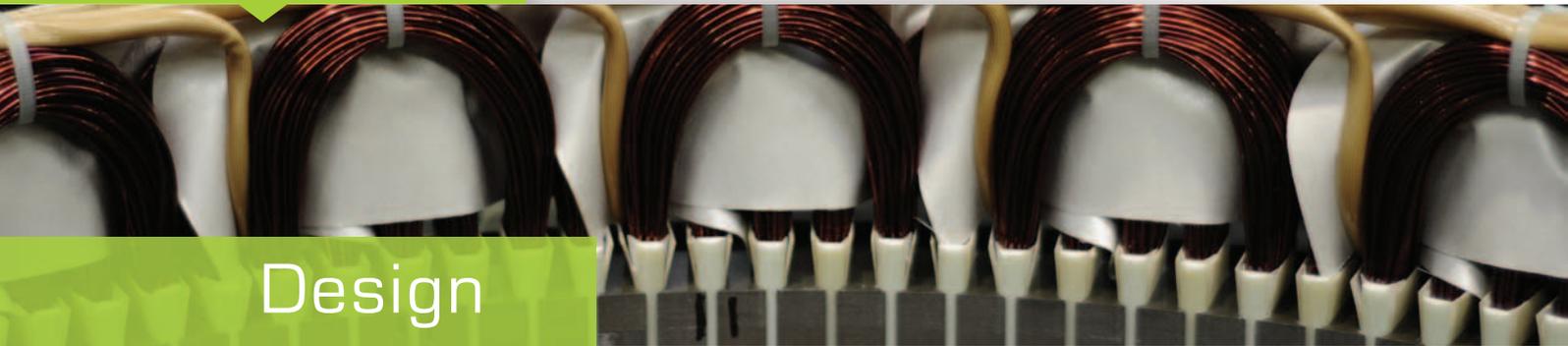
Output range: 200 - 1,500 kW
 Nominal speed: 250 - 1,500 min⁻¹
 Voltage: 400 - 6,600 V

Frequency: 50 or 60 Hz
 Shapes: horizontal as well as vertical
 Ingress protection: IP 23 - IP 56
 Cooling: air, water
 Overload capacity: speed or current, as specified
 Noise level: according to EN 60034-9, the design allows installation in the proximity of residential areas
 Vibrations: vibrations in compliance with EN 60034-14
 Bearings: according to the client's requirements

Asynchronous generators

Example of a TES generator type designation:

GS	00450	V	0375	MV
Generator type: GS - Synchronous generator GA - Asynchronous generator GP - Generator with permanent magnets	Output [kVA, kW]	Shape: H = horizontal V = vertical	Speed [min ⁻¹]	Voltage: LV = low voltage (up to 999 V) MV = medium voltage (1,000 - 9,999 V) HV = high voltage (from 10,000 V)



Design



Magnetic circuit

Double-sided insulated electrical steel sheets with low hysteresis loss, installed in the stator's frame, either circular or made up of segments, depending on the size of the machine. The rotor's magnetic circuit consists of electrical steel sheets or steel sheets drawn together into a pack, and fixed onto the shaft.



Stator

The stator's frame is made of welded steel sheets and profiles; it incorporates the stator pack consisting of electrical steel sheets drawn together by clamping rings. Feet are welded to the frame, with height and spacing corresponding to the client's requirements. The mechanical design ensures sufficient rigidity and mechanical strength.



Rotor

The rotor's pack incorporates a damping cage that provides optimum electrical parameters. It is fixed onto the shaft along with the exciter rotor, the rotating rectifier, and, in some cases, the fan. In the basic version, the end of the shaft is cylindrical, with a groove and a key. In special versions, the design is adapted to the client's requirements and to the installation of the flywheel or the brake. Full shaft or drilled shaft, according to turbine type. The rotor is dynamically balanced with a key, a half-key, or without a key. Smooth-core rotor or rotor with salient poles, according to the machine's electric design.



Winding and insulation system

Wire coils or profile coils of high-quality copper. The winding is mechanically reinforced with wedges, bandages and an impregnant. The rotor winding is also dimensioned for higher speeds.



Bearings and lubrication

The proper types and sizes of bearings are selected according to proven calculations and in close cooperation with the suppliers thereof. Rolling or sliding bearings from the world's leading manufacturers; lubricating and cooling systems specially developed for hydrogenerators. Rolling bearings are lubricated with grease or oil; sliding bearings are lubricated with internal oil or with oil circulated by an external lubrication unit.



Cooling

Methods of cooling used: IC 01 - self-ventilated, fan on the shaft, IC 06 - forced ventilated, independent fan, IC 21 - fan on the shaft, air outlet by piping, IC 26 - independent fan, air outlet by piping, IC 81W - water-to-air exchanger, fan on the shaft, IC 86W - water-to-air exchanger, independent fan.



Impregnation

Vacuum-pressure impregnation with epoxy resin UL2002T using modern equipment (thermal class H) or Resin Rich technology.



Terminal box

Easy access to terminals via a large terminal box located on the top or on the side of the frame. Locations of cable glands according to the client's requirements.

The terminal box contains the main connection terminals, terminals for sensors, control and measurement, regulators, and other necessary devices.

An auxiliary terminal box can be fitted for other devices.



Excitation

The excitation winding of the brushless exciter is powered directly by the regulator.

The power output generated in the three-phase rotor winding of the exciter is rectified by a 6-pulse bridge rectifier, and powers the rotor winding of the generator.



Control

Analogue and digital cos phi regulators / voltage regulators.

Breaking circuit for over-excitation with inverse time characteristics, circuit for self-excitation, 1- or 3-phase measurement and power supply from the generator's output.

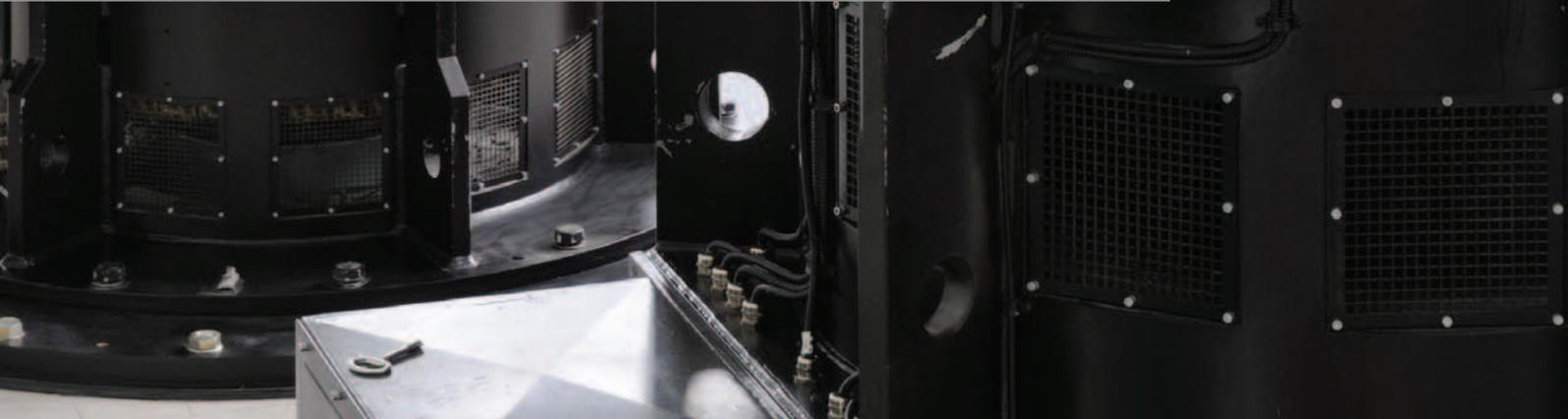
Parallel compensation and input providing compatibility for instance with power factor regulators / reactive power regulators or with excitation limiters.



The wide variety of accessories supplied will satisfy the most demanding design requirements as well as the needs of machine operators:

- Monitoring of temperature: winding, bearings, oil
- Speed measurement
- Monitoring of vibrations
- Anti-condensation heating
- Converters for sensors
- Measuring transformers of current, voltage
- Automatic bearing lubrication
- Equipment for moving from a horizontal to a vertical position (without the need to use 2 cranes)
- Flywheels
- Filters of input and output cooling air
- LifeProtect - a device for remote monitoring of the generators' parameters, for operational diagnostics, and for maintenance planning

Generator accessories





Service

A comprehensive range of services to maximize the long-term use of the machine. An experienced team of service technicians is ready to support clients at any stage of the project:

- Installation and commissioning
- Provision of maintenance service during the life of the machine
- Warranty and post-warranty service
- Delivery and installation of spare parts
- Generator repairs
- Consultancy and diagnostics also for products of other manufacturers



With 100 years of experience in the production of electrical equipment, TES aspires to be the global partner of choice for purpose-built rotating electrical machines, drives and components.



Hydro Power
Generation



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