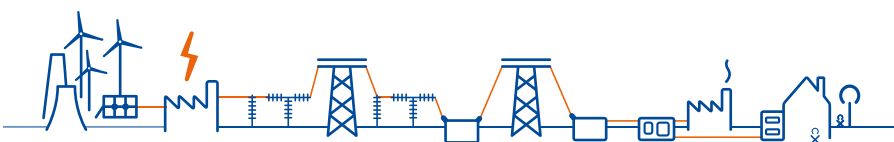
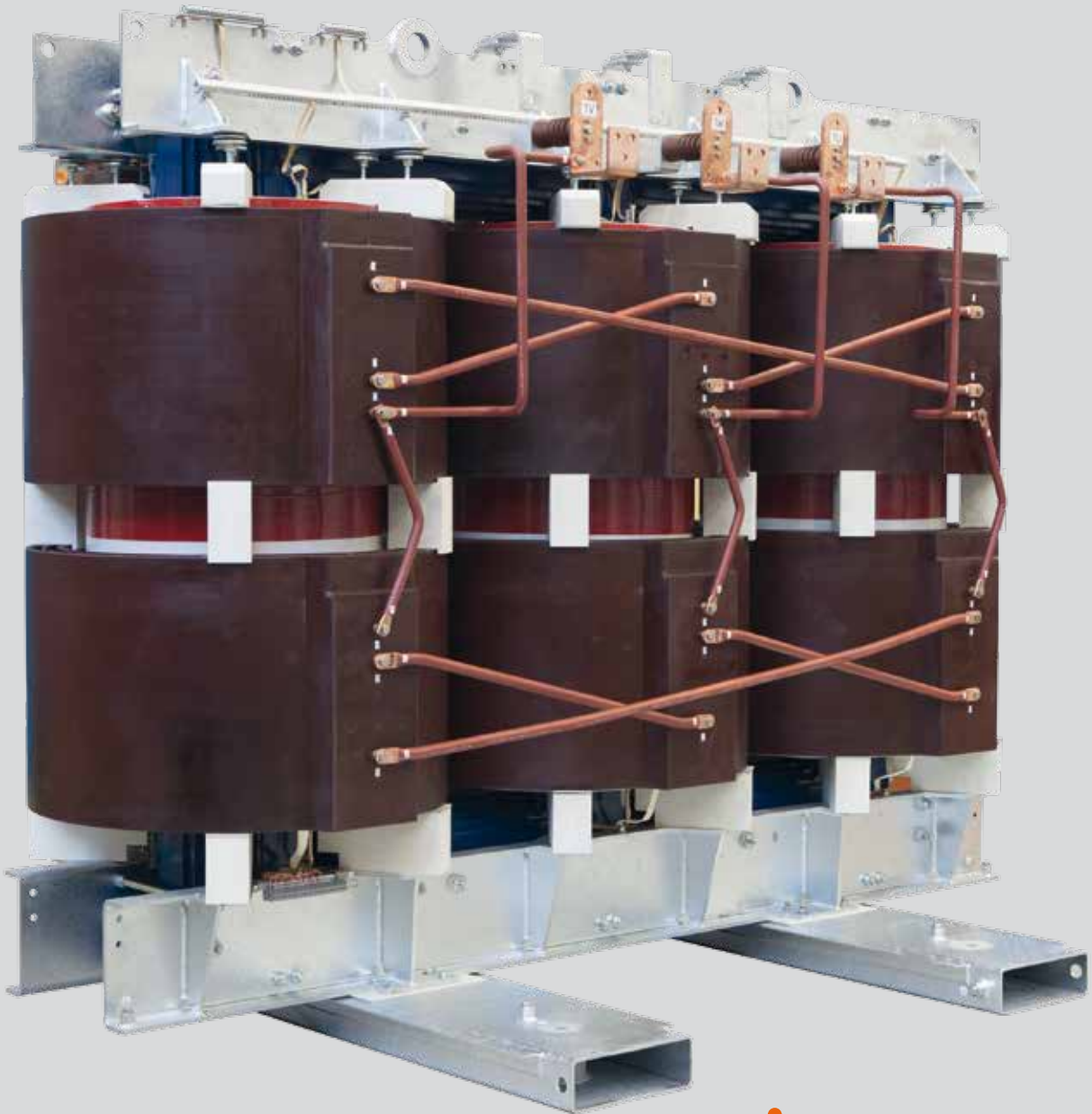


# CAST RESIN TRANSFORMERS



# SGB-SMIT AT A GLANCE

Combined, more than

# 415



## YEARS OF EXPERIENCE

Basis for know-how and  
for know-why

More than

# 2.000



## EMPLOYEES

take care of  
your project

In more than

# 80



## COUNTRIES

satisfied  
customers



## READY FOR YOUR MARKET

The SGB-SMIT Group manufactures transformers for applications worldwide. Sales and service centers on all continents ensure optimum processes.

Our products meet the requirements in accordance with the applicable national standards.



## PRODUCTS

- large power transformers
- medium power transformers
- large liquid-cooled distribution transformers
- liquid-cooled distribution transformers
- cast resin transformers
- shunt reactors
- series reactors
- phase shifters
- Lahmeyer-Compactstationen®

Transformers from 50 kVA up to incl. 1,200 MVA in the voltage range up to 765 kV.



## QUALITY MANAGEMENT

The SGB-SMIT Group is certified in accordance with:

- DIN ISO 9001
- DIN ISO 14001
- DIN ISO 50001
- OHSAS 18001



## TECHNOLOGIES

Technologies for conventional and  
renewable energy.

# CAST RESIN TRANSFORMERS MADE BY SGB-SMIT



## MAXIMUM RELIABILITY

Operators from all over the world appreciate the extremely high reliability of SGB-SMIT cast resin transformers, as they provide maximum safety:

- Over 40 years of experience:
- High degree of safety for operators and equipment
- Low environmental impact
- Low operating and maintenance costs
- Service over „a transformer’s entire service life“
- No fee end of transformer life factor return for recycling. Recycling rate is of over 90%



## FIELDS OF APPLICATION

SGB-SMIT cast resin transformers provide solutions for:

- Operation in grids subject to harmonic distortion
- Switching surges and lightning overvoltages
- Extreme environmental conditions:
  - very hot climates, e.g. desert regions
  - high environmental exposure (salt, air humidity, gases)
  - climatic areas with extremely low ambient temperatures (down to -50°C), e.g. the Arctic, Siberia
- High short-time overload requirement, e.g. up to 450 % of the rated power
- Mean long-term loads up to 140 % of the rated power with fans
- Power systems requiring a high degree of availability
- Loads due to switching surges (vacuum circuit-breakers)
- High demands regarding mechanical oscillations (crane, excavator, seismic areas, ships)
- Installation altitudes > 1,000 m

### WE SET NEW STANDARDS FOR OUR CUSTOMERS' BENEFIT:

SGB-SMIT cast resin transformers offer a range of features which distinguish them from other cast resin transformers in terms of technology and make them a highly reliable and extremely safe solution.

# OUR QUALITY – THE DIFFERENCE

SGB-SMIT has been producing cast resin transformers for over 40 years; thus, SGB-SMIT is one of the companies possessing the widest pool of experience in this area worldwide.



## EXPERIENCE SPANNING SEVERAL DECADES

SGB has ample operational knowhow on a worldwide basis, including international production sites and first-class international references in all industrial sectors. Specifically in the field of construction of wind power plants, SGB offers many years of experience and knowhow and provides proven systems:

- “Jet System” incl. special cooling system for onshore wind power plants
- “Safe system” which is specifically tailored to open sea conditions for offshore wind power plants

Moreover, SGB possesses ample experience in handling extreme climate conditions. Here, customers profit from reliable system solutions such as the “All Climate Safe System”.



### SPECIAL FEATURE

The special knowhow is reflected by a particularly high quality score, such as an above-average MTBF (mean time between failures).

## UNIQUE DESIGN

Electrically speaking, the multi-layer winding system is the most reliable option. Thus, almost all manufacturers of oil distribution transformers follow this principle. Millions of them have secured the energy supply in many countries worldwide for several decades.

## COMPUTERIZED PRODUCTION MONITORING

Based on a precise analysis according to automobile standards, all relevant production parameters of each transformer are recorded continuously and compared online to the set-point values. The next production step only follows if everything is found to be correct.

This system makes it possible to achieve a uniform level of quality over large production quantities at all locations of the SGB-SMIT Group on an international basis.

### SPECIAL FEATURE

SGB has optimized and/or further developed the special multi-layer winding and is the only manufacturer to use this principle for cast resin transformers!

# WHAT IS SPECIAL

The combination of many decades of experience, computerized production monitoring, unique design and extraordinary internal test equipment result in safe and reliable operation.



## INTERNAL TEST EQUIPMENT

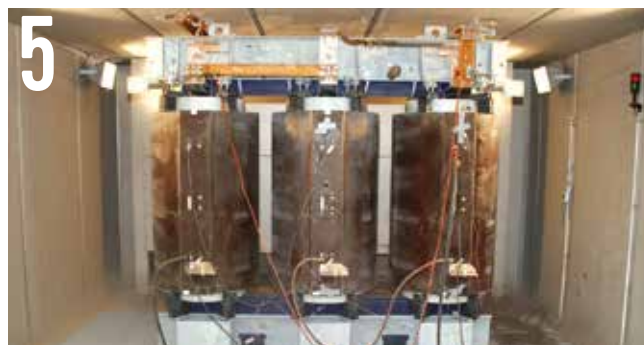
SGB-SMIT cast resin transformers are designed and manufactured as standard in accordance with IEC 60076-11. In line with the value-added chain at SGB-SMIT, the tests specified in the standard for routine and type testing are performed in our own, modern test area:

- All routine tests (Fig. 1)
- All type tests (Fig. 2):
  - special tests
  - noise measurement (Fig. 3).
  - verification of the climate class C2/C3 (Fig. 4)
  - verification of the environmental class E2/E3 (Fig. 5)
- External special tests:
  - Test of fire behaviour (destructive testing)
  - Dynamic short-circuit test acc. to IEC and GOST

Moreover, we perform detailed measurements for important technical areas together with external institutes:

- Electromagnetic compatibility (EMC)
- Analysis of fire gases or low-temperature carbonization gases
- Vibration test
- etc.

Cast resin transformers made by SGB-SMIT are delivered in over 50 countries – of course, design, manufacture and testing are based on the standards relevant in these countries such as ANSI, IEEE, GOST.



### SPECIAL FEATURE

SGB-SMIT is the first transformer manufacturer worldwide with internal C2/C3 and E2/E3 testing facilities! Verification is effected by the inspection agency „TÜV-Süd“ or other test institutes.

### SPECIAL FEATURE

Project-related acceptance tests by classification institutes such as Lloyds' Register, DNV-GL, Bureau Veritas or other inspection agencies such as TÜV-Süd are part of our day-to-day business.

# TOP FACTS



## REDUCED RISK OF IGNITION

Cast resin transformers have the edge over oil distribution transformers in that they feature a low fire hazard.

Even in case of a fire in the surroundings, the fire load is extremely low and there is no risk of permanently dangerous fire effluents.

This low ignition risk and the self-extinguishing character – verifying fire protection class F1 – are proven by tests following the European regulations and IEC-standard.

The fact that no coolant is used for cast resin transformers make inclusion of complex collector tanks for coolant and the oil sampling by specialists which is necessary on a regular basis for liquid transformers a thing of the past. The air-cooled cast resin transformer is thus considered as largely “maintenance-free”.

### SPECIAL FEATURE

For the above reasons, SGB cast resin transformers do not require any special extra measures to ensure fire protection!



## OPERATIONS POSSIBLE DOWN TO -50°C

In regions with considerably fluctuating temperatures and severe cold snaps such as Russia, Canada or Northern China, transformers are subject to high strain.

SGB-SMIT cast resin transformers have been used for quite some time in Siberia, where they manage power supply in residential areas at temperatures down to -50°C!

SGB-SMIT cast resin transformers satisfy these requirements flawlessly!

To verify climate classification C2/C3, SGB-SMIT cast resin transformers are tested and qualified by thermal shock testing in accordance with the European body of rules and standards IEC. The test includes cooling down of the transformers to -25°C and quick re-heating.

### SPECIAL FEATURE

The C2/C3 test has been performed since 2012 in SGB-SMIT's own test chamber!



## OPERATION UNDER SPECIFIC MECHANICAL CONDITIONS

The use of cast resin transformers

- in earthquake areas ...
- aboard ships ...
- in wind turbines ...
- in cranes ...

... requires special design features due to the mechanical strain imposed by accelerations in excess of 1 G.

### SPECIAL FEATURE

Various vibration tests have been performed successfully at customers' request and in cooperation with IABG Ottobrunn.



## APPLICATION IN HUMID AND SALTY ENVIRONMENTS

- In offshore wind parks ...
- On oil platforms...
- In coastal and/or tropical installations ...

... cast resin transformers are exposed to aggravated conditions due to the salty, corrosive atmosphere.

Suitability of the SGB-SMIT cast resin transformers for the appropriate environmental class E2/E3 is proved by a test according to the European body of regulations and standards IEC.

While this test was formerly limited to a one-time proof on a single transformer, today, a separate test for each new turbine type is required in the wind industry – a standard which SGB-SMIT is pleased to fulfil.

### SPECIAL FEATURE

The E2/E3 test has been performed since 2012 in SGB-SMIT's own test chamber!

# EXAMPLES OF APPLICATIONS

SGB-SMIT cast resin transformers make minimum demands on the site of installation. Below, please find a few examples for possible applications.

## AUTOMOTIVE / ELECTROMOBILITY:

Substations, subdistributions and infrastructure projects.

## RAILWAY:

DC supply for underground and suburban railways.

## STORAGE BATTERIES AND CHARGING STATIONS:

“Split-Powerline” concepts.

## MINING:

Underground and surface infrastructure, crane and excavator operations.

## CHEMICAL / PHARMA SECTOR:

Rectifier and distribution applications for installation inside and outside.

## POWER PLANTS / PSC:

“Power to” applications.

## NAVY:

Ship propulsions, shore connections in harbours.

## METALS AND PAPER INDUSTRY:

Roller mill motors and pumps.

## OIL AND GAS:

Refineries, air separation units and oil and gas platforms.

## DATA CENTERS:

Server facilities and cooling.

## REGENERATIVE INDUSTRY:

- Onshore wind
- Offshore wind





# CERTIFICATION

SGB not only satisfies the standards regarding production technology and occupational health and safety, but also has high self-imposed standards and takes the challenge also in environmental matters – which is highlighted by awards and certificates issued by various institutes.

## DAS UL-SICHERHEITSPRÜFZEICHEN: SYMBOL FÜR VERTRAUEN

Unconditional delivery of cast resin transformers in the USA requires certification by UL. UL is the abbreviation for “Underwriter Laboratories”, an independent organization from the USA which examines products with a view to safety, and certifies them. Due to the increasing demands from the wind industry in all of Northern America, but also in order to supply industrial applications in the USA without reservation, the certificate was obtained in record time.

To this effect, UL states:

“Previous in-house attempts to tackle testing were too complicated and other partners offered limited services. The two-phased approach of <Program Assessment> and <Testing & Certification> designed by UL and ELTEK dramatically simplified the process.

The new approach advances from:

- project design, development of the test procedure and protocol, test specimen construction,
- to implementation, full long-term testing
- and finally evaluation of results, and UL certification

Although there were numerous parts and aspects to be tested, the certification process was completed within one year. That’s a big improvement over the standard 3 - 5 years needed for the testing and certification of high-voltage electrical insulation systems!”

## DNV GL

DNV GL, the largest provider of independent energy expertise and certifications worldwide, has awarded the component certificate to Starkstrom-Gerätebau GmbH for their latest transformer. The transformer type DTTH1NG 2500/30, 50 Hz has been developed specifically for application in wind turbines. Dr. Matthias-Klaus Schwarz, Head of the Electrical System Division at DNV GL, added: “Cooperation with SGB in this valuation was extremely pleasant; which helped performing the component certification for their transformer within less than two months.”

## ENVIRONMENTAL PROTECTION

The low energy consumption, the long service life (> 20 years) and the degree of recyclability of 95% of the materials used save resources and help reduce CO<sub>2</sub> emissions considerably.

 <b>TÜV ISO 9001</b> Quality and performance	 <b>FSK</b> Requirements of the Russian grid company
 <b>TÜV ISO 14001</b> Environmental protection	 <b>JSC VNIAM</b> Requirements of the Russian nuclear industry
 <b>TÜV ISO 18001</b> Occupational Safety and Health	 <b>UL</b> American Quality and Safety Requirements
 <b>DNV GL WIND ONSHORE</b> Certification for suitability in onshore wind turbines	 <b>F1-CESI</b> Fire protection class
 <b>DNV GL WIND OFFSHORE</b> Certification for suitability in offshore wind turbines	 <b>C2/E2 KEMA AND CESI</b> Climate and environment class
 <b>GOST</b> Satisfies Russian quality and safety requirements	

All certificates are renewed on a regular basis

## VOICE OF OUR CUSTOMERS

“We were more or less frustrated with the bigger companies who always were late with the delivery times or had no time for us and we looked for a new partner – now we are very satisfied with them.”

“Sometimes there are quality problems but that’s normal. Important is how they solve it and care about it, that’s absolutely positive.”

“From my perspective the biggest advantage is, when they promise something they do everything to fulfil this and hold it every time.”

# KNOW-HOW WORLDWIDE

Due to worldwide deployment by our wind energy customers and a high number of industrial customers, SGB-SMIT has invested in international production sites over the past few years.

## SGB-USA, LOUISVILLE, OH, USA:

Assembly works for the supply to our customers in Northern and Central America.



1



2

## SGB, REGENSBURG, GERMANY:

Complete cast resin transformer factory to supply our customers within Europe.

## SGB CZECH, TRINEC, CZECH REPUBLIC:

Complete cast resin transformer factory for standard applications.

## SGB CHINA, YANCHENG, JIANGSU, P.R. CHINA

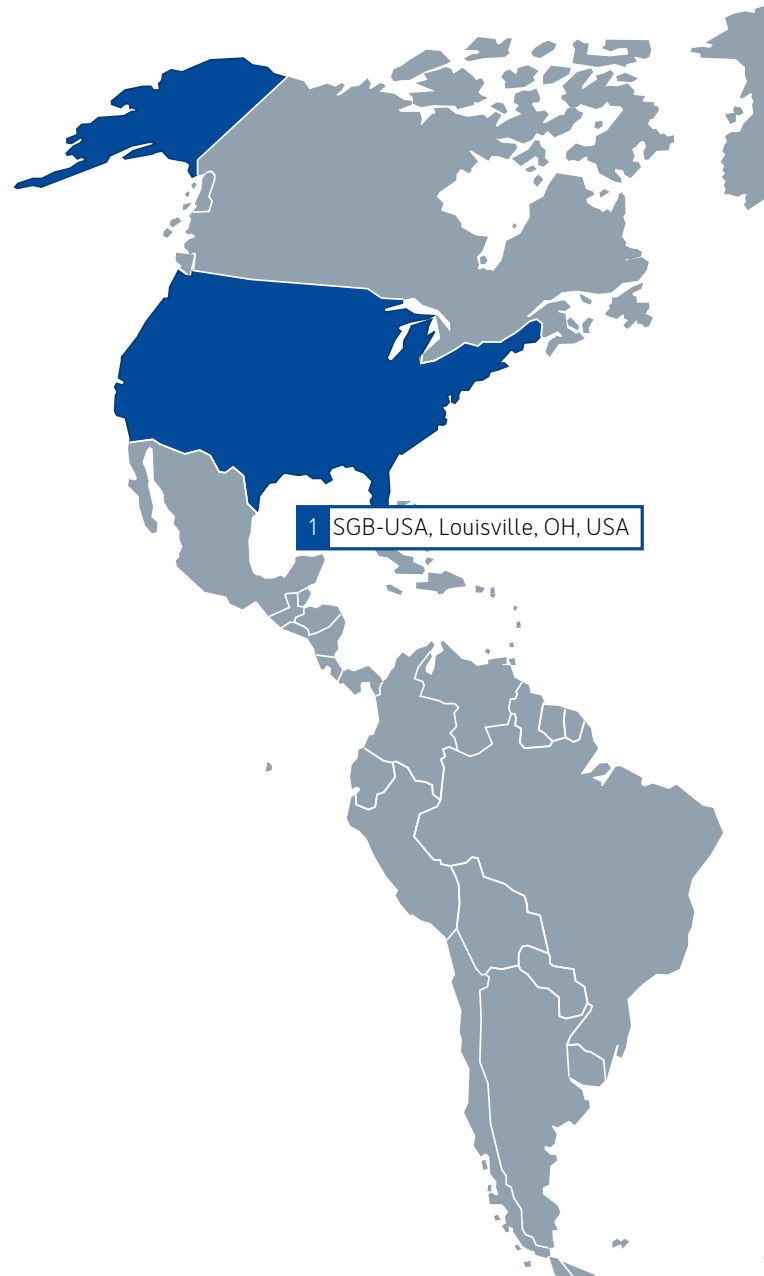
Assembly works for the supply of our customers for wind offshore plants.

## SGB TRANSFORMERS INDIA, CHENNAI, INDIA:

Assembly works to supply our customers in India.

## SGB MY, NILAI, MALAYSIA:

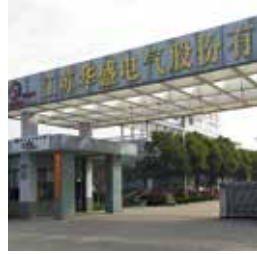
Complete cast resin transformer factory to supply our customers in Asia, Africa and South-Western Asia and the Middle East.



1 SGB-USA, Louisville, OH, USA



3



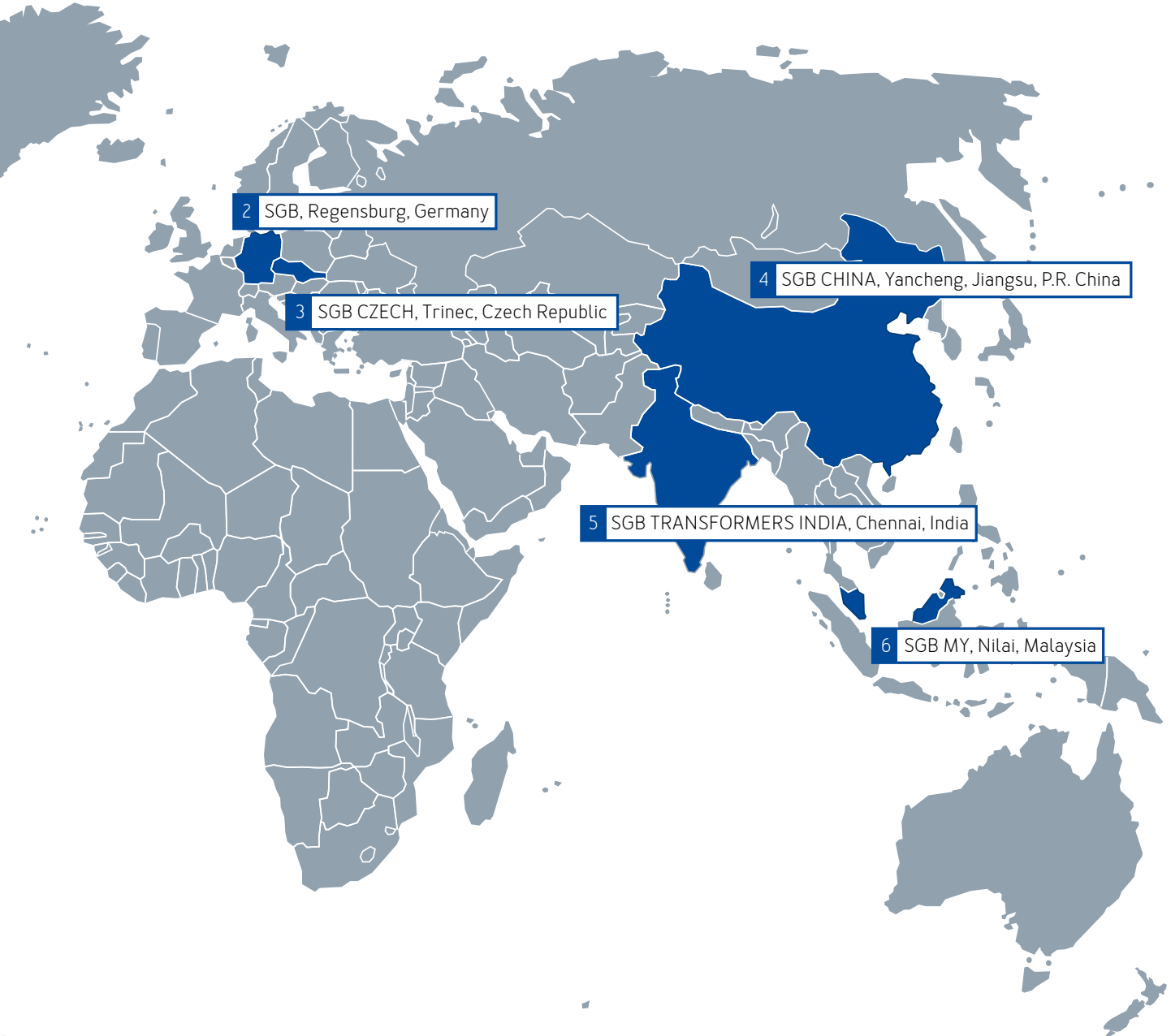
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