

# NER'S, LNER'S & COMBINED NEUTRAL EARTHING RESISTORS (NECRT'S)





# SGB-SMIT AT A GLANCE





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

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.



Technologies for conventional and renewable energy.

### 

processes.

#### QUALITY MANAGEMENT

The SGB-SMIT Group is certified in accordance with:

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

# SGB SMIT POWER MATLA A MEMBER OF THE SGB-SMIT GROUP



SGB-SMIT POWER MATLA has over 70 years experience in successful design, manufacturing, testing, installation and commissioning of a full range of power and distribution transformers which include large power transformers of voltages up to 800MVA.

### **SGB-SMIT POWER MATLA**

SGB-SMIT POWER MATLA (Pty) Ltd is owned by SGB-SMIT (GmbH) and Power Matla.

SGB-SMIT, is the largest independent and pure-play transformer manufacturer in the world, with headquarters in Regensburg, Germany. They are represented on 5 continents in 8 countries with plants in Germany, the Netherlands, USA, Romania, Malaysia, India, China and the Czech Republic. With transformer expertise since 1913 they produce transformers ranging from 50 kVA up to 1,200 MVA.

Power Matla (Pty) Ltd is a locally owned black empowered company with investments in various portfolios within the renewable energy, ICT, mining and power utilities markets providing good shareholder value and solid returns.

The company consists of Large Power Transformers manufacturing plant in Pretoria and Distribution Transformers plant in Cape Town and supplies a full range of transformers, from generator step-up to transmission and distribution transformers. The range includes three-phase and singlephase units, auto-transformers, arc-furnace, locomotive and traction transformers, miniature sub-stations, NECRT's as well as shunt reactors.

### **"CUSTOM DESIGNED"**

Every SGB-SMIT POWER MATLA unit is custom-made from standardised design elements and using uniform manufacturing operations. This flexible, but well co-ordinated approach ensures the highest quality of design and construction for all our transformers and makes the best possible use of the valuable knowledge and experience gained over the years and best practices developed in our factory.

The Large Power Transformer factory in Pretoria is a wellequipped factory and is amongst the biggest and most sophisticated transformer manufacturing plants within the Southern Hemisphere and one of two large transformer manufacturers within sub-Saharan Africa.

The Distribution Transformer factory in Cape Town has been manufacturing distribution transformers and miniature substations for more than 60 years.



# SMALL, MEDIUM AND LARGE POWER TRANSFORMERS ALL OVER THE WORLD



### **OVERVIEW**

SGB-SMIT POWER MATLA is one of South Africa's largest and most experienced manufacturers of distribution transformers. Designed, tried and tested under the harshest of African conditions, our distribution transformers and miniature substations have proven themselves for more than 70 years. Our experience ensures our products are manufactured to meet the needs of local conditions whilst meeting all major national and international standards. Our products are used in utilities, local authorities, mines, industrial plants and motor manufacturers.

Our distribution transformer range starts at 16kVA to 5MVA transformers with primary voltages of up to 36kV and 200kVA to 2500kVA miniature substations with primary voltages of up to 36kV. We also produce neutral eathing resistors (NER's), neutral earthing compensators (NEC's) and NECRT combinations.

# QUALITY, HEALTH, SAFETY & ENVIRONMENT

The distribution transformer plant located in Epping 2 (Western Cape) has a fully certified ISO 9001 quality management system, ISO 14001 environmental management system, as well as the ISO 45001 health and safety management system, ensuring stringent quality assurance programmes, in accordance with the very specific requirements is rigidly adhered to. This leads to products of the highest quality

The transformers and miniature substations carry the SABS Mark of Approval. At every stage during manufacturing, the materials and processes are inspected by suitably qualified and experienced inspectors, to ensure all required standards and manufacturing practices are adhered to.











### **SUPPLY CHAIN**

SGB-SMIT POWER MATLA prides itself in our ability to leverage our global network. We also manufacture most of the transformer structural components in-house. Raw materials and components not manufactured in-house are sourced from world class suppliers. Procurement of material and components is done from a list of pre-qualified suppliers, locally and internationally, who are certified to conform with the highest standards in terms of Quality [ISO9001], Health and Safety [ISO 45001] as well as Environmental (ISO 14001) respectively.

Before a supplier is approved, their capability is assessed, by taking into consideration their technical ability; quality control system; safety, health and environmental controls; financial viability as well as other commercial factors. Supply Level Agreements are put in place with key suppliers to ensure availability of stock and continuity of supply. A number of enterprise development initiatives are considered for development of small independent business units.

SGB-SMIT POWER MATLA applies strict control of incoming raw material from pre-qualified suppliers. All incoming goods are quality-controlled and checked before they are released into the sub-assembly manufacturing lines. Where certification is required, the raw material is sent to our on-site SANAS accredited laboratory in Pretoria for material analysis, verification and certification. Any non-conforming product is rejected and returned to the supplier for rectification or replacement.

### NER'S, LNER'S & NECRT'S

The earthing system plays a very important role in an electrical distribution network. It is important for network operators and end users to ensure avoidance of damage to equipment, thereby providing a safe operating environment for personnel and continuity of supply.

Neutral earthing resistors (NERs), sometimes called Neutral Grounding Resistors, are usually installed in AC distribution networks to limit transient overvoltages that flow through the neutral point of a transformer or generator to a safe value during a fault event.

NER's are generally connected between ground and neutral of transformers, This equipment reduces the fault currents to a maximum pre-determined value that avoids a network shutdown and damage to equipment, whilst allowing sufficient flow of fault current to activate protection devices to locate and clear faults.

This equipment must absorb and dissipate a huge amount of energy for the duration of the fault event without exceeding temperature limitations as defined in IEEE32 standards.

It is exceedingly important that the design and selection of an NER is correct to ensure equipment and personnel safety as well as continuity of supply.

## NER'S, LNER'S & NECRT'S MADE BY SGB-SMIT POWER MATLA



### **DESIGN AND MANUFACTURE**

When designing NER's, LNER's and NECRT's the following factors must be considered:

- Rated voltage: the line-to-neutral voltage.
- Rated current: maximum current that will flow through resistor when it is cold.
- Duty rating or time rating: length of time the NER must tolerate rated current.
- Short time rating: normally 10 seconds or 20 to 30 seconds depending on design parameters of the protection system.
- Typically 10A in accordance with ESKOM requirements. When and if required, the continuous current can be incorporated as 10% of the short time rated current. Normally 10% of full load current for healthy system neutral earthing resistor is designed for continuous rating of 5% to 10% of full load current (if required).
- Insulation: specified based on line voltage.
- Temperature rise: the maximum short time temperature rise for the resistive element is 450°C according to IEEE32.

### **BENEFITS**

Fault current and transient over-voltage events can be costly in terms of network availability, equipment costs and compromised safety.

Continual interruption of electricity supply, considerable damage to equipment at the fault point, premature ageing of equipment at other points on the system and a heightened safety risk to personnel are all possible consequences of fault situations.

By installing this equipment on distribution networks and controlling fault currents and transient over-voltages, the following benefits can be realised:

- Eliminate or reducte physical damage to equipment
- Extend the life of the connected distribution equipment namely transformers and related equipment
- Reduced operation and maintenance costs
- Simplification and fast isolation and clearing of faults
- Improvement in network security and reduction in unplanned outages



### TESTING

Routine tests according to SANS 780 and SANS/IEC 60076 are made on every unit prior to despatch:

- Measurement of winding resistance (only applicable to the NEC and NECRT combinations)
- Measurement of voltage ratio and verification of polarity and connection symbol (only applicable to the auxillary in the NECRT)
- Measurement of impedance voltage and load loss (only applicable to the NEC and NECRT combinations)
- Measurement of no load loss and no load current (only applicable to the NEC and NECRT combinations)
- Induced overvoltage withstand test
- Separate source voltage withstand test
- Measurement of paint thickness
- Test for effectiveness of sealing

Type tests to SANS 780 and SANS/IEC 60076 can be undertaken on request.

- Full impulse voltage withstand test
- Full and chopped impulse voltage withstand test
- Temperature rise test (this is a type test which is performed together with the short circuit test
- Tank stiffness test

Special tests according to ESKOM specification can be made on request.

- Short circuit withstand test (subject to limitations of SABS high current laboratory equipment)
- Measurement of audio sound level

### **TECHNICAL SPECIFICATION**

Liquid Neutral Earthing Resistors (LNER) System Voltage  $\leq 36 kV$ 

#### Fault current and duration

2kA for 3Os ≤ 11kV 2kA for 2Os ≤ 22kV International Patent

### Neutral Earthing Resistors (Combination Unit) (NECRT) System Voltage

 $\leq$  36kV

#### Fault current and duration

Up to and including 96OA for a duration of up to 30 seconds with a maximum voltage of 36 kV

10A continuous rating or 10% of short time current rating (if specified. The standard is 10A.



### **DIMENSIONS (APPROXIMATELY ONLY)**

| kV  | Short Time Current | Continuous Current * | Length (mm) | Width (mm) | Height (mm) | Mass (kg) |
|-----|--------------------|----------------------|-------------|------------|-------------|-----------|
| 6.6 | 360                | 10                   | 2670        | 1360       | 3220        | 2335      |
| 11  | 360                | 10                   | 2620        | 1500       | 3260        | 2550      |
| 22  | 360                | 10                   | 2700        | 1620       | 3275        | 3550      |
| 33  | 360                | 10                   | 2700        | 1880       | 3300        | 5300      |
| 11  | 800                | 10                   | 2650        | 1700       | 3250        | 3910      |
| 22  | 800                | 10                   | 2720        | 1900       | 3280        | 5475      |

\* Specified by customer

^**\\** <sup>°</sup> e



### CONTACT

| Regensburg • Germany   | Summerville, SC • USA  |
|--|--|
| Phone +49 941 7841-0   | Phone +1 843 871-3434  |
| SÄCHSISCH-BAYERISCHE<br>STARKSTROM-GERÄTEBAU GMBH<br>Neumark • Germany<br>Phone +49 37600 83-0 | <b>SGB-USA INC.</b><br>Tallmadge, OH • USA<br>Phone +1 330 472-1187  |
| ROYAL SMIT TRANSFORMERS B.V.   | OTC SERVICES INC.  |
| Nijmegen • The Netherlands   | Louisville, OH • USA   |
| Phone +31 24 3568-911  | Phone +1 330 871-2444  |
| SMIT TRANSFORMER SERVICE   | <b>SGB MY SDN. BHD.</b>  |
| Nijmegen • The Netherlands   | Nilai • Malaysia   |
| Phone +31 24 3568-626  | Phone +60 6 799 4014   |
| RETRASIB S.A.  | <b>SGB TRANSFORMERS INDIA PVT. LTD.</b>  |
| Sibiu • Romania  | Chennai • India  |
| Phone +40 269 253-269  | Phone +91 44 45536147  |
| SGB CZECH TRAFO S.R.O.   | SGB CHINA CO. LTD.   |
| Olomouc • Czech Republic   | Yancheng • P.R. China  |
| Phone +420 605 164860  | Phone +86 515 88392600   |
| BCV TECHNOLOGIES S.A.S.<br>Fontenay-le-Comte • France<br>Phone +33 251 532200                  | SGB-SMIT POWER MATLA (PTY) LTD<br>Pretoria West • South Africa<br>Phone +27 12 318 9911<br>Cape Town • South Africa<br>Phone +27 21 505 3000 |

# Subject to technical changes.

#### SGB-SMIT POWER MATLA

1 Buitenkant Street. Pretoria West 8 Eliot Avenue, Epping 2, Cape Town Phone +27 12 318 9911 Fax +27 86 524 7167 e-mail info@sgbsmitpowermatla.com

www.sgbsmitpowermatla.com www.sgb-smit.com

