

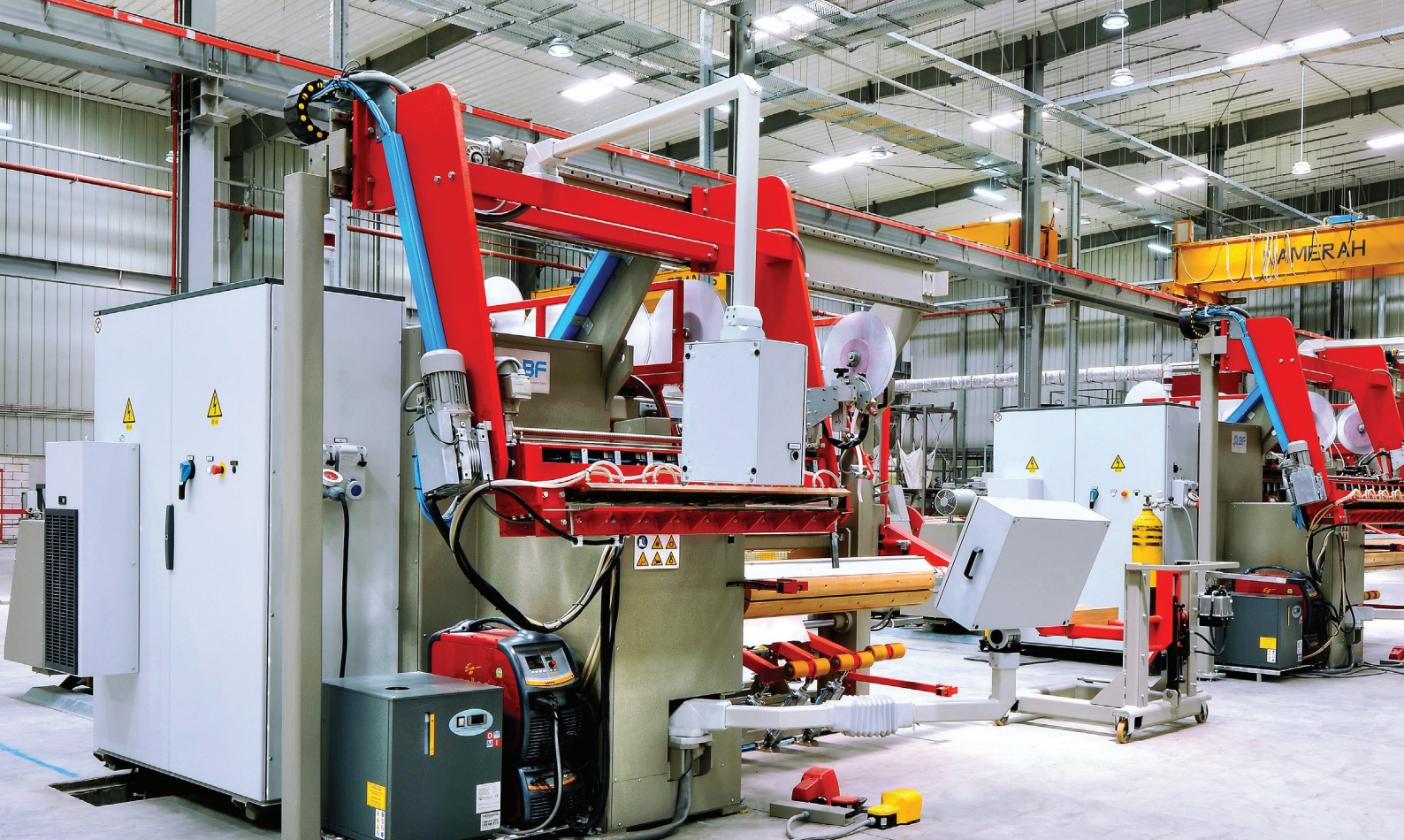


# TRANSFORMERS & BUSWAYS SOLUTIONS



DISTRIBUTION TRANSFORMERS  
OIL IMMERSED  
100kVA – 2500kVA, 36kV  
CATALOG





# BAHRA TBS OIL IMMERSED & CAST RESIN TRANSFORMERS & BUSWAYS SOLUTIONS

The power solutions for commercial and industrial sector applications



Bahra TBS provides a comprehensive selection of Oil Immersed distribution transformers ranging from 100kVA to 2500kVA, engineered to ensure the reliability, durability, and efficiency essential for utility, industrial, and commercial applications.



The liquid-filled transformers produced by Bahra TBS adhere to the highest industry and international standards, and local standards with compliance to key regulations from IEC to SASO being standard practice. This commitment extends to the exclusive use of premium materials, with quality assured through the latest technology, equipment, and processes that are continuously refined.



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# BAHRA TBS FACTORY OVERVIEW

## INTEGRATED SOLUTIONS FOR GLOBAL PROJECTS



**Bahra Electric** began in 2008 and it is a leading manufacturer of an extensive range of electricity distribution products. In 2015, **Bahra Electric** expanded its manufacturing facilities & product range by creating a new factory “**Transformers and Busways Solutions Company**” specialized in producing high efficiency transformers and busways in partnership with **Legrand France** as an initiative to localize the important industries in the kingdom of Saudi Arabia and to become market leader in its industry. In-line with Kingdom of Saudi vision 2030, **Bahra Electric** has acquired **Transformers and Busways Solutions Company (TBS)** in 2021 and has signed a license agreement with **Legrand France SA** permitting to use the existing designs and knowhow. **Bahra Electric** has crafted the new brand of TBS to be a **Bahra TBS**.

**Bahra TBS** is spread across 50,000 sq m area equipped with state-of-the-art latest European & Italian technology with complete backward process integration including epoxy casting and tinning. The manufacturing facility have implemented the Integrated Management Systems: ISO 9001, ISO 14001 & ISO 45001 as well as SASO mark.

### IEC & ISO 9001 QUALITY PRODUCTS

Our design and R&D have broken new ground in transformers systems. The Design and Quality of every single product is overseen by Bahra TBS.

State of the art manufacturing processes guarantee long lasting quality. Standard options for protection and temperature management are used according to specific installation needs.

#### Certifications:

- IEC 60076 / IEC 60068-3-3
- IEC 60529
- IEC 60616 / IEC 61378 / IEC 62032
- Seismic
- SASO

### CUSTOMER SUPPORT FULL FLEDGED SERVICE

We persist on providing our customers ultimate services starting from the beginning of the project all the way to the final installation and onwards

#### Complete customer service:

- Customizable solutions
- Technical and training support
- Project design
- On-site surveys
- Validated accurate measurements
- Plans and drawings verifications
- Fast deliveries and lead time
- Product warranty
- After Sales support

### QUALITY CONTROL IN-HOUSE TESTING

- Windings Resistance Measurement
- Transformer Ratio Measurement and Check of the Polarity
- Impedance Voltage and Load Losses Measurement
- No load Current and Losses Measurement
- Insulation Test with Applied Voltage
- Insulation Test with Induced Voltage
- Partial Discharge Measurement
- Lightning Impulse Withstand Measurement
- Temperature Rise Test
- Noise Level and Noise Pressure Measurement
- Dielectric test





**Details matter. At TBS you can rest assured that your project is managed and executed in a professional manner. Every single detail is important. A full-fledged team of experts overlook your projects from the very beginning of the design stage all the way to the testing and commissioning and even after the handing over of your project.**

#### Design Support



We provide consultants a design support from the very beginning. Our design department is able to make solid electrical systems covering every detail of your requirements.

#### Technical Support



Our skilled technical expertise is at your disposal for consultation, training, orientation and support during the course of your project. We conduct regular training courses.

#### Product Availability



Our factory along with our wide network of partners and distributors in the Middle East region ensure a sustainable product availability to secure fast deliveries, efficient logistics alteration.

#### Testing & Commissioning



We cover all preliminary tests and inspections, functional performance tests and the supervision of commissioning of busways & transformers.

#### After Sales Service



A vast team of technical experts within Bahra TBS and our partners' teams are at your disposal for extending full After Sales Support meeting your expectations.

### Technical Support at your service

**Bahra TBS** with its innovation and cutting-edge technology continue setting up latest trends in the market which enables us to meet the needs of our customers. You can be assured that your project is handled in the most efficient and professional manner meeting the industry standards and specifications.

**We have all the necessary resources used to keep pace with market trends through our:**

- Technical expertise - capable of providing the most practical and cost effective solutions for projects of any size.
- Bahra TBS Design office - supports customers throughout every step of their project providing a single contact, which is competent and easy to reach.
- Strong presence and experience of all our partners and distributors in the market.

## **Bahra TBS Oil Immersed Distribution Transformers**

Bahra TBS Oil Immersed Distribution Transformers range from 100 kVA up to 2500 kVA, with primary voltages up to 36 kV. Bahra TBS distribution transformers, including specific designs for power centers, substations, networks and pad mounts. Transformers are an integral part of power systems with applications in industrial facilities, commercial buildings and utility transmission and distribution networks. The core and coil design is a unique characteristic of Bahra TBS oil type transformers, which generate the reliability, durability and reduced dimensions required for their application in utilities, industrial installations and public distribution. Bahra TBS oil type transformers are manufactured in accordance with the international quality standards ISO 9001 and ISO 14001.

Transformer quality is of the utmost important, Technical/Engineering at Bahra TBS in oil transformer is a continuous process. Our experienced team and highly qualified engineers ensures that research and development are constantly working for the improvement and innovation of our products to suits with the market requirements.

### **Applicable Standards**

The transformers comply with the requirements of the following standards:

IEC 60076 Power Transformers IEC 60076-1 General

IEC 60076-2 Temperature rise for liquid-immersed transformers

IEC 60076-3 Insulation levels, dielectric tests and external clearances in air

IEC 60076-5 Ability to withstand short circuit

IEC 60296 Unused mineral insulating oils for transformers and switchgear

IEC 60137 Insulated bushings for alternating voltages above 1000 V

IEC 60529 Classification of degree of protection provided by enclosures

IEC 60551 Measurement of transformer and reactor Sound Level



## Construction Features

### Iron Core

The core is a series of laminations made from high-quality, grain-oriented silicon steel or laser etched. The stacked core provides a superior flux path by utilizing a step-lap that joins the core legs to the top and bottom yokes. The effective support for the core together with a step-lap joint have reduced existing currents by up to 40%, sound levels by up to 3 dB and iron losses by up to 10%. The core efficiently fills the opening in the coil, leaving a minimum of unused space. The yoke between the legs of the core reduces the external flow between the active leg core materials, resulting in an increase in efficiency. The semicircular shape of the core can be more uniformly and firmly supported to prevent movement of the laminations so as to improve sound level characteristics.

### Windings

The coil features a low voltage rectangular wire or sheet conductor extending along the full height of the coil. The layer insulation is coated with a diamond pattern of B-stage epoxy adhesive, which cures during processing to form a high strength bond. This bond keeps the windings from moving during operation or under short circuit stresses. The high to low insulation is fitted over the low voltage winding and the wire of the strap wound high voltage is wound directly over the low voltage to form a high strength coil assembly. The oil ducts extend along the height of the coil to provide cooling in the winding. The staggered, diamond epoxy bonds help assure free oil flow through the winding. Accurately located taps and a large winding cross section keep unbalanced ampere-turns to a minimum. Unbalanced ampere-turns create forces during short circuits that push the high voltage and low voltage coils apart vertically. By minimizing this imbalance vertical forces are correspondingly reduced, thus making the design stronger under short circuit stresses. The large areas presented by the layer-type winding result in a low ground capacity, which gives a nearly straight line surge distribution throughout the winding. A compact, high-impulse strength coil is the result.

### Transformer Fluids

A choice of transformer fluids, including mineral oil, silicone and MIDEI, is offered with most ratings. Mineral oil is usually recommended for outdoor applications. Silicone MIDEI 7131 are classified as less flammable fluids and are used when flammability is a concern. Transformers designed with less flammable fluids can be used to meet specific requirements of non-flammability. MIDEI eN 1215 & MIDEI 1204 are a new, fully biodegradable, environmentally friendly dielectric fluid that is also classified as less flammable. MIDEI eN 1215 & MIDEI 1204 has been shown to be 97% biodegradable within 21 days by underwriters, laboratories. MIDEI eN 1215 & MIDEI 1204 are suitable for indoor applications and in areas of high environmental sensitivity where any insulating fluid spill would require expensive clean-up procedures.



Midel eN 1204  
Rapeseed/Canola



Midel eN 1215  
Soybean



Midel eN 7131  
Synthetic

## Construction Features

### Tank Types

The transformer tank is usually a non-rigid structure with corrugated panels designed to withstand mechanical stress, absorb oil expansion, and meet heat dissipation limitations. Materials are made from high quality steel plates to ensure durability. The tank walls are built with corrugated steel and with steel walls or with corrugated walls only for top bushing arrangements. Through the corrugation, cooling ribs are formed to increase the surface of the tanks. This way effective cooling of the insulation liquid is achieved. To ensure the tightness of the tank welding is tested with ultra violet rays. The tank is painted with high quality painting by flood painting using epoxy or by electrostatic painting.

## Transformer Classifications

### Standard losses Small/Medium/ Large Distribution Transformers

#### Small Distribution Transformers

three phase oil type small distribution transformers within the range up to 250 kVA and 36 kV. The transformers are adaptable for pole mounting or assembly in substations.

#### Medium Distribution Transformers

range from 300kVA up to 2000kVA from are used to step down three phase high voltage to low voltage for power distribution, mainly in metropolitan areas and for industrial applications. The transformers in standard versions are designed for use in moderate climates and can be installed both outdoors and indoors. The loading is in accordance with IEC 60076-7. Transformers are hermetically sealed (the tank is completely filled with oil) or equipped with oil conservator.

Both types are equipped with flexible corrugated tank walls enabling sufficient cooling of the transformer. They also compensate for the changes in the oil volume during operation. An advantage of the hermetically sealed transformers is that the oil is never in contact with the atmosphere thus avoiding periodic oil analysis.

#### Large Distribution Transformers

rating above 2000kVA are used to step down three phase high voltage to low voltage for power distribution, mainly in metropolitan areas and for industrial applications. The transformers in standard versions are Designed for use in moderate climates and can be installed both outdoors and indoors. The loading is in accordance with IEC 60076-7.

Transformers are hermetically sealed (the tank is completely filled with oil) or equipped with oil conservator. Both types are equipped with flexible corrugated tank walls enabling sufficient cooling of the transformer. They also compensate for the changes in the oil volume during operation. An advantage of the hermetically sealed transformers is that the oil is never in contact with the atmosphere thus avoiding periodic oil analysis.

#### Magnetic Core

The magnetic circuit is of the three column type with mitred joints. It is manufactured with grain oriented silicon iron sheets insulated with carlita. The mounted core is clamped down in order to reduce vibrations and minimize noise levels.



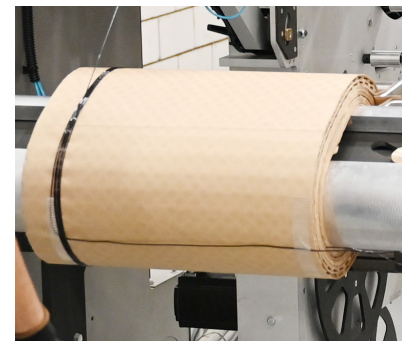


## Transformer Classifications

### Standard losses Small/Medium/ Large Distribution Transformers Magnetic Core

#### Windings

The windings of the transformers are made of high grade electrolytic copper or aluminum. The High Voltage windings are wound either with round, enamel insulated, or shaped, paper insulated wire. The Low Voltage windings are wound with shaped, paper insulated wire or foil. The winding construction is characterized by high dielectric strength with high resistance, to atmospheric surges and to the effects of short-circuits. Neutral points of the Low Voltage windings are brought to the tank cover



#### Off- circuit tap changer

The off-circuit tap changer is of a 5-position type connected on the High Voltage side with a handle located on the cover. The tap changer should be operated only when the transformer is deactivated.

Standard tapping are  $\pm 2 \times 2.5\%$  of the HV winding. The mechanism can be padlocked during normal operation. The off-circuit tap changer with other applicable steps can be installed.



#### Processing

The factories are equipped with the state of the art machinery such as modern Autoclave drying ovens as well as oil treatment plant for drying and degassing process of the oil. The drying and degassing process of the oil is controlled automatically. The process oil is then filled into the transformer tank under vacuum environment to ensure full and reliable impregnation of the insulating materials, free of any air voids to guarantee high voltage withstand strength.



#### Transformer Oil

The mineral oil with its electrical and chemical characteristics complies with the IEC Standards and is P.C.B. and P.C.T. free.

#### Tank and cover

The cover is bolted to the tank frame. The transformer undercarriage is provided with bidirectional rollers turnable by  $90^\circ$  to allow longitudinal and transverse movement on flat surfaces.

#### Painting and surface treatment

The transformer tank is usually a non-rigid structure with corrugated panels designed to withstand mechanical stress, absorb oil expansion, and meet heat dissipation limitations.

Materials are made from high quality steel plates to ensure durability. The tank walls are built with corrugated steel and with steel walls or with corrugated walls only for top bushing arrangements. Through the corrugation, cooling ribs are formed to increase the surface of the tanks. This way effective cooling of the insulation liquid is achieved. To ensure the tightness of the tank welding is tested with ultra violet rays. The tank is painted with high quality painting by flood painting using epoxy or by electrostatic painting.

## Transformer Classifications

### Standard losses Small/Medium/ Large Distribution Transformers

#### Standard Features

The hermetically sealed transformers are delivered completely assembly filled with Transformer oil:

- High and LV bushing
- OCTC in 5 positions
- Lifting lug
- Earthing terminals
- Oil Thermometer
- Oil filling pocket
- Drain valve with plug
- Rating and diagram plate
- Uninhibited mineral oil
- Pressure relief device



#### Options

The following options and accessories can be offered:

- Plug-in bushing
- Dial type thermometer with 2 contacts
- Pressure relief device with 2 contacts
- OCTC with more than 5 positions
- Cable box
- Galvanized tank
- Dual voltage transformer
- DMCR

Conforms to international standards and local authority requirements as per IEC 60076 standards



#### Technical Data

Transformer Type	Three Phase, Oil Immersed Distribution Transformers		
	(Indoor or Outdoor Installation)		
Type of Breathing	Hermetically Sealed /Radiator		
Standard	IEC60076		
Rated Frequency	60Hz		
Connection and Vector Group*	Dyn11		
Ambient Temperature*	Ambient=50	Oil=50	Winding=55
Winding	CU or ALU		
Type of Cooling	ONAN		
HV Tapping*	Off-circuit tap changer 5 positions $\pm 2 \times 2.5 \%$		

\* Subject to change according to customer requirements.



## Transformer Classifications

### Standard losses Small/Medium/ Large Distribution Transformers

(Aluminum)

Rated Power kVA	HV(kV)	LV(kV)	No Load Loss W	Load Loss W	Impedance%
100	13.8	0.4	300	2150	4
160	13.8	0.4	440	2600	4
200	13.8	0.4	480	2950	4
250	13.8	0.4	550	3650	4
300	13.8	0.4	630	4200	4
400	13.8	0.4	750	5000	4
500	13.8	0.4	850	6000	5
630	13.8	0.4	900	8000	5
800	13.8	0.4	1250	9000	5
1000	13.8	0.4	1450	12000	6
1250	13.8	0.4	1700	13000	6
1500	13.8	0.4	1850	16500	6
1600	13.8	0.4	2050	18000	6
2000	13.8	0.4	2800	19500	6
2500	13.8	0.4	3000	25500	6
300	33	0.4	630	4200	4
500	33	0.4	850	6000	5
630	33	0.4	900	8000	5
1000	33	0.4	1450	12000	6
1250	33	0.4	1700	13000	6
1500	33	0.4	1850	16500	6
1600	33	0.4	2050	18000	6
2000	33	0.4	2800	19500	6
2500	33	0.4	3000	25500	7

\* Subject to change according to customer requirements.

## Saudi Electricity Transformers (SEC)

### Pad Mounted Transformers

These transformer are with HV and LV cable boxes on the opposite with Ingress of protection of IP54. Installation can be outdoor or indoor depending on the type of applications.



### Technical Data

Transformer Type	Three Phase, Oil Immersed Distribution Transformers		
Type of Breathing	Hermetically Sealed		
Standard	51-SDMS-03 & 04 (ALU) or 51-SDMS-01 & 02 (CU)		
Rated Frequency	60Hz		
Connection and Vector Group	Dyn11		
Ambient Temperature	Ambient=55	Oil=45	Winding=50
Winding	CU or ALU		
Type of Cooling	ONAN		
HV Tapping	Off-circuit tap changer 5 positions $\pm 2 \times 2.5 \%$		

## Saudi Electricity Transformers (SEC)

### Pad Mounted Transformers SEC (Aluminum)

Rated Power kVA	HV(kV)	LV(kV)	No Load Loss W	Load Loss W	Impedance%	Width mm	Depth mm	Height mm
300	13.8	0.4	520	3200	4	1500	1300	1400
500	13.8	0.4	750	4700	5	1650	1300	1500
1000	13.8	0.4	1100	9000	6	1800	1400	1700
1500	13.8	0.4	1700	14000	6	2000	1600	2000
300	33	0.4	520	3200	4	1600	1400	1500
500	33	0.4	750	4700	5	1700	1400	1600
1000	33	0.4	1100	9000	6	1950	1600	1800
1500	33	0.4	1700	14000	6	2100	1700	2100

### Pad Mounted Transformers SEC (Copper)

Rated Power kVA	HV(kV)	LV(kV)	No Load Loss W	Load Loss W	Impedance%	Width mm	Depth mm	Height mm
300	13.8	0.4	520	3200	4	1500	1250	1400
500	13.8	0.4	750	4700	5	1600	1300	1500
1000	13.8	0.4	1100	9000	6	1750	1450	1700
1500	13.8	0.4	1700	14000	6	1950	1600	2000
300	33	0.4	520	3200	4	1450	1400	1500
500	33	0.4	750	4700	5	1650	1400	1600
1000	33	0.4	1100	9000	6	1850	1500	1800
1500	33	0.4	1700	14000	6	2000	1650	2100



## Saudi Electricity Transformers (SEC)

### Pole Mounted Transformers

Pole mounted transformers are electrical distribution transformers mounted on a utility pole (wood or concrete) and usually at the level of overhead cables.



#### Technical Data

Transformer Type	Three Phase, Oil Immersed Distribution Transformers		
Type of Breathing	Hermetically Sealed		
Standard	51-SDMS-03 & 04 (ALU) or 51-SDMS-01 & 02 (CU)		
Rated Frequency	60Hz		
Connection and Vector Group	Dyn11		
Ambient Temperature	Ambient=55	Oil=45	Winding=50
Winding	CU or ALU		
Type of Cooling	ONAN		
HV Tapping	Off-circuit tap changer 5 positions $\pm 2 \times 2.5\%$		

#### Pole Mounted Transformers SEC (Aluminum)

Rated Power kVA	HV(kV)	LV(kV)	No Load Loss W	Load Loss W	Impedance%	Width mm	Depth mm	Height mm
100	13.8	0.4	250	1500	4	1350	900	1600
200	13.8	0.4	380	2200	4	1450	1100	1700
300	13.8	0.4	520	3200	4	1450	1100	1700
100	33	0.4	250	1500	4	1350	900	1600
200	33	0.4	380	2200	4	1450	1100	1700
300	33	0.4	520	3200	4	1450	1100	1700

## Saudi Electricity Transformers (SEC)

### Unit Substations

The device transformer is designed for commercial and industrial applications to convert distribution voltages to operating voltages. They are constructed so that they are easy to interconnect with both a primary and secondary switch.



### Technical Data

Related Specification	56-SDMS-07, 56-SDMS-09	USS With aluminum transformer & aluminum busbars LVDP
	56-SDMS-01, 56-SDMS-03	USS With copper transformer & copper busbars LVDP
Ambient Temperature		Up to 55 C
Outdoor color		RAL 7035 or RAL 7033
Location of Operation		Outdoor
Degree of Protection		Up to IP 54
Electrical Characteristics		
Nominal Unit S/S Rating	kVA	300, 500, 1000, 1500kVA
MV Rating	kV	13.8 kV, 33 kV, 34.5-33kV (dual)
LV Rating	V	400V, 230V, 400-230V (dual)
Rated Frequency	Hz	60
Transformer		
Rated Transformer	kVA	Up to 1500
Vector Group		Dyn11
Low Voltage Panel		
Main Incomer	A	Up to 4000 A
Metering Devices		Digital
Busbar		Tin Plated Aluminum / Copper Busbar
LV Panel Distribution Units		Branch MCCB/ Main Breaker / Both

## Saudi Electricity Transformers (SEC)

### Non-Mineral Oil Transformers (KNAN)

The name of cooling types of oil distribution transformers depends on the flash point of the oil used in the transformer. Mineral oils are marked with the letter "O" and have a flash point of at least 135 °C according to standard IEC 60296- Ed.5, 2020.

Non-mineral oils such as silicone oil, synthetic ester (also known as "Midel" in the market) and Natural Ester (vegetable oils) are marked with the letter "K" because their flash point is higher than 300 . °C.

Each KNAN converter cooling letter stands for:

K - Indicates flash point above 300 degrees Celsius N - Natural

A - Air

N - Natural

- 100% fire safety record
- High flash point >300°C
- Classified class K
- Known flammability
- Self-extinguishing
- No risk of pool fire



Midel eN 1204  
Rapeseed/Canola



Midel eN 1204  
Rapeseed/Canola



Midel eN 1215  
Soybean



Midel eN 7131  
Synthetic



## Package and Unit Substations

Bahra TBS Package and Unit Substations are completely self-contained solutions for power distribution that include outdoor duty enclosure, medium voltage switchgear, distribution transformer, low voltage panel, and accessories such as power factor improvement equipment, control and protection equipment, all providing a cost effective and efficient total installation. It can be manufactured Step Down/Step up substations, MV/MV, MV/LV, LV/LV

The solution packages are built in accordance to IEC Standards and Saudi Electricity Company (SEC) specifications, where the distinguished design provides the customer with a high level of flexibility to cover a wide range of applications.

The construction of the unit substation is almost the same as the package substation but without RMU on the MV side.



### MV Side (Ring Main Unit)

Each package substation contains the MV part which is in most cases the Ring Main Unit, known as the (RMU). Bahra TBS will provide only SEC approved manufacturer.

### Transformer

The transformer is the main part of every package and unit substation, where the type is changeable based on customer specification and application:

- Oil immersed conservator type or hermetically sealed or dry type transformers can be installed
- Transformer bushings can be located on top or side of transformer as per customer needs
- Wide range of transformer capacities up to 2500 kVA
- Typical kVA's: 100, 150, 160, 200, 250, 300, 315, 400, 500, 630, 750, 800, 1000, 1200, 1250, 1500, 1600, 2000, 2500
- Bahra TBS package and unit substations are designed for simple and easy transformer installation onsite or integrated into the PSS in the factory

## Package and Unit Substations

### Low Voltage Panel

LV Panel is manufactured for safe distribution and efficient control of electricity in residential, commercial and industrial premises. Bahra TBS LV products conform to most national and international standards.



- Incoming feeder options can be directly connected with circuit breakers and busbar links
- The LV busbar rating depends on the transformer rating
- Various number and ratings of outgoing feeders depend on transformer size and customer requirements
- Equipment for metering, protection, BMS, SCADA and control is available
- Incoming breaker up to 5000 A (Drawout/Fixed, Manual/Motorized)
- Current transformers
- Outgoing circuit breakers



## Service

To complement its position as a market leader of transformer manufacturing and supply, Bahra TBS provides testing and commissioning services.

Our highly qualified and competent commissioning engineers undertake the complete electrical testing and commissioning of transformers and ancillary equipment.

This service is split into two groups:

- Dead testing is performed on the circuits when the transformers are de-energized, and from the initial testing of the circuits to outline the insulation resistance of the new circuits, and the continuity for the ring circuits.
- Live testing is performed on the circuits if the result of the dead test has been recorded as unsatisfactory, and once the installation has been put back together following the dead testing.

List of tests to be conducted:

- Visual inspection
- Measurement of insulation resistance
- Measurement of winding resistance
- Measurement of voltage ratio and vector group
- Energizing the transformer





## Testing



### Routine Tests

- Measurement of winding resistance
- Measurement of voltage ratio and phase displacement
- Measurement of short circuit impedance and load losses
- Measurement of no-load losses and current
- Dielectric routine tests (separate source AC voltage withstand test and short duration induced over-voltage withstand test)
- Measurement of insulation resistance
- Oil leakage test

### Type Tests

- Temperature rise test according to IEC 60076-2
- Lightning impulse test according to IEC 60076-3

### Special Tests

- Short circuit withstand test (as per IEC 60076-5)
- Measurement of zero-sequence impedance(s) on three-phase transformers
- Determination of sound levels (as per IEC 60076-10)
- Measurement of the harmonics of the no-load current



# NOTES

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A large, empty grid of small squares, intended for writing notes. The grid consists of approximately 25 columns and 40 rows of squares.





## Transformers and Busways Solutions Company

### Transformers and Busways Solutions Co. (LLC) - TBS

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