Innovative and Environment Friendly Technology

Primary distribution substation; Switching substations; Mobile substations; Substations for distribution generation; Substations for power plants.

Power supply substations for Airport & Railways.

Securities houses and Banking companies

Iron and steelworks factories; Semiconductor factories; Chemical and petrochemical plants; Automobile industry; Mining industry; Paper mills.

Hospitals; Water and wastewater plant equipment; Seawater desalination plants.

Broadcasting companies; Telecom companies; Internet service providers.

Toshiba started producing metal-clad enclosed switchgears in 1926 and has continued providing highly reliable switchgears to a wide range of applications ever since.

Furthermore, since its development of Japan’s first vacuum circuit-breaker in 1965, Toshiba has been continuing to accumulate expertise in vacuum switch technology, building a reputation as a leading company in the production of vacuum components.

Through more than 50 years of experience and expertise in vacuum circuit-breaker technology.

Solid Insulated Switchgear (SIS) is a reliable switchgear which utilizes high-performance epoxy resin independently developed as the insulating material for SIS instead of the use of SF₆. This promotes global warming prevention by eliminating the use of SF₆, a potent greenhouse gas.

This epoxy resin provides improvement in strength, flexibility, heat-resistance and dielectric strength compared with the conventional our products using SF₆. Also, by using this material for switchgear insulation, Toshiba was able to reduce the switchgear size while maintaining the equipment’s high reliability.

It has a modular design allowing easy customization and installation.

Therefore, Toshiba is offering a compact, safe and reliable switchgear that fits your systems needs.

SF₆ Gas Free Solid Insulated Switchgear

Innovative and Environment Friendly Technology

Segregated
Bus-bars of all each three phases are segregated from each other contributing to the significantly reduction of the internal arc fault risks.

Surface Shielded
All surface of the solid insulated parts are fully covered with a conductive layer grounded to earth. This contributes to the significantly reduction of earth fault risk.

SF₆ Gas Free Solid Insulated Switchgear

APPLICATIONS

UTILITIES
- Primary distribution substation
- Switching substations
- Mobile substations
- Substations for distribution generation
- Substations for power plants

TRANSPORTATION
- Power supply substations for Airport & Railways

FINANCIAL SECTOR
- Securities houses and Banking companies

INDUSTRIAL SECTOR
- Iron and steelworks factories
- Semiconductor factories
- Chemical and petrochemical plants
- Automobile industry
- Mining industry
- Paper mills

PUBLIC INFRASTRUCTURE
- Hospitals
- Water and wastewater plant equipment
- Seawater desalination plants

TELECOM SECTOR
- Broadcasting companies
- Telecom companies
- Internet service providers
Environment-friendly

SIS utilizes Toshiba’s highly efficient epoxy resin as an alternative insulating material to potent greenhouse SF₆ gas. This epoxy resin is also made with recyclable materials and have a low environmental impact.

Compact and Light

Weight and volume of the switchgear are substantially reduced by using epoxy resin insulation compared with the conventional Toshiba’s products using SF₆. This leads to carrying SIS by elevators and easier equipment installation.

Modular Design

Unit type solid insulated bus can make flexible arrangements. Hence, field assembly and installation of additional units can be carried out easily.

High Reliability

Through the complete insulation of all live parts with epoxy resin, the switchgear is protected from outside influence such as salt damage, snow damage and dust, thus promoting less maintenance and prolonged product quality.*

*Please contact us, SIS may not be used under certain conditions.

Low Maintenance

SIS structure is simpler product structure with about 50% number of parts reduced than the conventional Toshiba’s products using SF₆. This significantly simplifies maintenance requirements.

Epoxy Resin Insulation

Toshiba’s SIS utilizes its propriety epoxy resin technology for insulation instead of air or SF₆ gas. Toshiba’s This epoxy resin technology, soft grained material, is reinforced with multi-diameter spherical silica particles thus improving its material strength and heat withstand temperature as compared to Toshiba’s conventional epoxy resin.

Embedded VI for VCB / VDS

Toshiba’s high quality Vacuum Interrupters (VI) are applied not only for Circuit Breaker (VCB) but also Disconnecting Switch (VDS) of the SIS. Toshiba’s VI are produced to ensure high reliability by assembling them in a modern clean room and by using high vacuum degassing furnaces. The success of solid insulation application on disconnecting switch is the first in Japan.

Arc Fault Risk Minimization

All of the main circuit is insulated by Toshiba’s epoxy resin mold casting. Furthermore, this insulated circuit is embedded in a grounded outer layer allowing isolation of each bus-bar from another. With this, SIS reduces the phase to phase arc fault risk and earth fault risks.

Condition Monitoring

SIS has a vacuum deterioration monitoring device inside. This device can also be used in analyzing partial discharge of the insulation medium when necessary. If an unexpected incident occurs and damages the SIS to its limits, this device detects and alerts before damages reach serious conditions.
Toshiba’s new and improved Vacuum Interrupter (VI) is utilized as the Vacuum Circuit Breaker, and Vacuum Disconnecting Switch for SIS. It is maintenance free and can be spring-motor or operated. This vacuum interrupter has better insulation level, maintenance free and is more compact and lightweight compared to Toshiba’s conventional VCB.

*IEC 62271-100 and VDE 0671-100 Compliant

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*IEC 62271-100 and VDE 0671-100 Compliant

VACUUM INTERRUPTER

Voltage transformer is also embedded in epoxy resin thus free from outside influence such as salt damage, snow damage and dust. It is inductive type VT with a plug-in design and can be mounted at the busbar or at the panel connection.

*IEC 60 044-2 and VDE 0414-2 Compliant

VOLTAGE TRANSFORMER

Single pole, ring-core current transformer design. CTs are of inductive type and can be mounted at the busbar, at the panel connection or around the cable.

*IEC 60 044-1 and VDE 0414-1 Compliant

CURRENT TRANSFORMER

Surge arresters are separable and equipped with plug-in type bushings. These surge arresters prevent the intake of high over voltages produced by the reflection of traveling waves. If SIS is connected to the transmission line via a cable route, it is necessary to protect the transition between the cable and the transmission line with suitable arresters.

*IEC 60099-4, DIN VDE 0675 and EN 50180/EN 50181

SURGE ARRESTER

Single pole, modular and bolted design. All busbars are fully insulated by epoxy resin and coated with earthed layer realizing a safe-to-touch feature. It can be fitted with CTs, VTs, and Surge Arrestors.

BUSBAR

Compact and user friendly GRE-110 multi-function protection relay is designed for feeder protection applications in medium voltage networks. It can be used as backup protection for generators, transformers and feeders in high voltage networks as well.

The GRE-140 is a fully numerical multi-function directional overcurrent protection device designed for feeder protection applications in MV Networks, providing a comprehensive range of protection and control functions. This compact and cost-effective device can be applied not only as feeder protection but also as back-up protections for HV/EHV equipment and feeder.

GRE-Series Relay product range also includes GRE-120 (Motor Protection and Control), GRE-130 (Voltage and Frequency Protection and Control), GRE-160 (Transformer Protection) and GRE-170 (Machine Protection), which can be employed in the SIS depending on customer requirements.

PROTECTION RELAY

Certification

Tested and certified IEC-62271-100 IEC-62271-102 and IEC-62271-200 compliant switchgear by CESI.
Typical Structure

Incoming / Feeder panel

- 3-Phase 40.5kV
- 2-Phase 27.5kV

VT Panel

- 3-Phase 40.5kV
- 2-Phase 27.5kV

Bus-Tie Panel

- 3-Phase 40.5kV
- 2-Phase 27.5kV

Double Bus Incoming / Feeder Panel

- 3-Phase 40.5kV

Double Bus VT Panel

- 3-Phase 40.5kV
Typical Structure

Double Bus-Tie Panel

3-Phase 40.5kV

Double Bus-Coupler Panel

3-Phase 40.5kV

Standard Dimensions

<table>
<thead>
<tr>
<th>Rating</th>
<th>Width [mm]</th>
<th>Depth [mm]</th>
<th>Height [mm]</th>
<th>Weight [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>24kV - 1250A</td>
<td>700</td>
<td>1600</td>
<td>1900</td>
<td>1300</td>
</tr>
<tr>
<td>36kV - 1250A</td>
<td>800</td>
<td>1800</td>
<td>2000</td>
<td>2000</td>
</tr>
<tr>
<td>24 / 36kV - 2000A</td>
<td>800</td>
<td>2000</td>
<td>2100</td>
<td>1800</td>
</tr>
<tr>
<td>40.5kV - 1250A</td>
<td>600</td>
<td>1500</td>
<td>1900</td>
<td>1600</td>
</tr>
<tr>
<td>72kV - 800A</td>
<td>800</td>
<td>1800</td>
<td>2300</td>
<td>1800</td>
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<td>84kV - 800A</td>
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<td>2300</td>
<td>1800</td>
</tr>
<tr>
<td>72 / 84kV - 1250A</td>
<td>800</td>
<td>2000</td>
<td>2300</td>
<td>2000</td>
</tr>
<tr>
<td>27.5kV - 1250 / 2000A</td>
<td>600</td>
<td>1500</td>
<td>1900</td>
<td>1400</td>
</tr>
</tbody>
</table>

This table shows dimensions of single-bus feeder panel for each rating.