

GIS

Gas Insulated Switchgear

PARS
Sanat Parand
Know-How Based Co.

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OUTLET BOX
TYPE I 25A
EMERGENCY STOP
BENQ



About Pars Sanat Parand (PSP)

Pars Sanat Parand (PSP) was established in 2006 as an integrator of Gas Insulated Switchgear (GIS) and manufacturer and integrator of Medium Voltage Switchgears under license of ABB Italy and full scope of Low Voltage Switchgears.

PSP has been the only GIS domestic manufacturer holding License and approval from Ministry of Energy, TAVANIR and Planning & Budget Organization since 2019 as a manufacturer of HV Gas Insulated switchgear up to 252kV. The next milestone was achieved in 2021 and PSP entered the league of Know-How based corporations and received the certificate from the Iranian vice-president in Research and Technology. PSP has two factories (GIS manufacturing and Panel manufacturing) in Parand Industrial Park covering 72,000 m^2. Total number of employees and subcontractors sum up to more than 200.

Mission

- Leading GIS manufacturer and integrator in Iran, Middle East, Africa and CIS regions
- Manufacturing HV GIS on "A Bay-A Day" basis by



extending domestic demand and exporting top quality GIS to Middle East, Africa and CIS regions

- Achieving 100% domestic manufacturing for all GIS components
- Intimate and efficient cooperation with well-established universities as a member of Know-How-based companies league

Introduction

PSP teams of experts have 22 years of edge-of-technology experience in design, supply, HV test, supervision and energizing HV GIS substations up to 400kV in Iran and abroad with a full cooperation of AREVA, ALSTOM and GE since 1999. PSP-CHINT strategic cooperation commenced in 2016 leading to the manufacturing license for GIS up to 252kV.

At the end of 2013, PSP manufactured its new MV Switchgear named UniPars which



was promoted along with PSP MV Vacuum Circuit Breaker; VPS1.

Pars Sanat Parand Co. developed its Low voltage distribution panel by trade name SIVAPARS, which type tested in IPH Berlin laboratory and medium voltage switchgear by trade name UNIPARS which type tested in EU IEC-accredited laboratories.

Product Range

- HV Gas Insulated Switchgear (GIS) up to 252kV
- Local Control Cubicle (LCC) for all voltage levels up to 400kV GIS
- MV AIS Switchgears UniGear PZ1, UniGear PZ2
- MV AIS Switchgears UNISAFE , UNIPARS up to 24KV
- Vacuum Circuit Breaker (VCB) VPS1 up to 36kV
- LV Switchgear MLVAC / MLVDC, MCC, ACFB and DCFB
- DC Switchgear (under development)



- Full range of Control, Protection, Marshalling, Common, Server, DS/ES box, DS box, RTU/HVI, Interface, SCADA, AVR, Follower, Measuring and Capacitor bank control panels

Sales References

Worldwide presence in five countries and two continents provides PSP a unique techno-commercial experience among domestic corporations. Reliable and high-qualified products and solutions to clients is one of the important results of such approach. PSP provides high quality products, services and solutions by presence in over 150 domestic and overseas projects in a wide range of industries and clients such as Ministry of Energy (power, water and wastewater sectors), TAVANIR and all Regional Electric Companies, Oil and Gas Refineries, Power Plants, Petrochemical Plants, Steel, Aluminum and Copper Industries, Water Desalination Plants, Cement Factories, Automobile Industry and many other urban sectors.

Sales References

With its outstanding performance and quality, GIS provided by PSP has been widely adopted by utilities, industrial end users, contracting & engineering companies both domestically and abroad.

Supply, Commissioning and Test

- DEWA, MUSHRIF, DUBAI
- BPDB, MORADPUR, BANGLADESH
- BPDB, RAMPUR
- BANGLADESH
- PEDEEE, SYRIA
- NIGELEC, NIGER
- POGC
- NIGC
- OEID
- NIOC
- PGSEZ
- IPDC
- TAVANIR
- MAPNA
- TANA ENERGY
- NEYR PERSE
- DAMAVAND PETROCHEMICAL
- MOBIN PETROCHEMICAL
- FREC, FARS
- EREC, ISFAHAN
- TREC, TEHRAN
- MREC, MAZANDARAN
- AREC, AZARBAYEJAN
- KREC, KERMAN
- WREC, KERMANSHAH
- HREC, HORMOZGAN
- SURO, FARS
- TURO, TEHRAN
- KUSRO, KARAJ
- SAIPA CO
- SSCO
- MOND-DASHTI CEMENT
- IGDC
- IWPCO
- KHUZESTAN STEEL CO
- ARVAND JAHANARA STEEL CO
- BARDSIR STEEL CO
- SIRJAN STEEL CO
- ZARAND STEEL CO
- GHAENAT STEEL CO
- CHARMAHAL STEEL CO
- AL-MAHDI ALUMINIUM PLANT
- HORMOZAL ALUMINIUM PLANT
- BANDARABBAS WATER DESALINATION PLANT



South Pars 400kV GIS
Client : **MAPNA**



Mobin 132kV
Client : **N.P.C**



Gonbad 63 kV GIS
Client : **MREC**



Ekbatan 63 kV GIS
Client : **TUSRC**



TARASHT 63kV GIS
Client : **TREC**



Bandar Abbas Desalintion Palnt 63kV GIS
Client : **TANA ENERGY GROUP**



South Pars 132kV GIS
Client : **MAPNA**



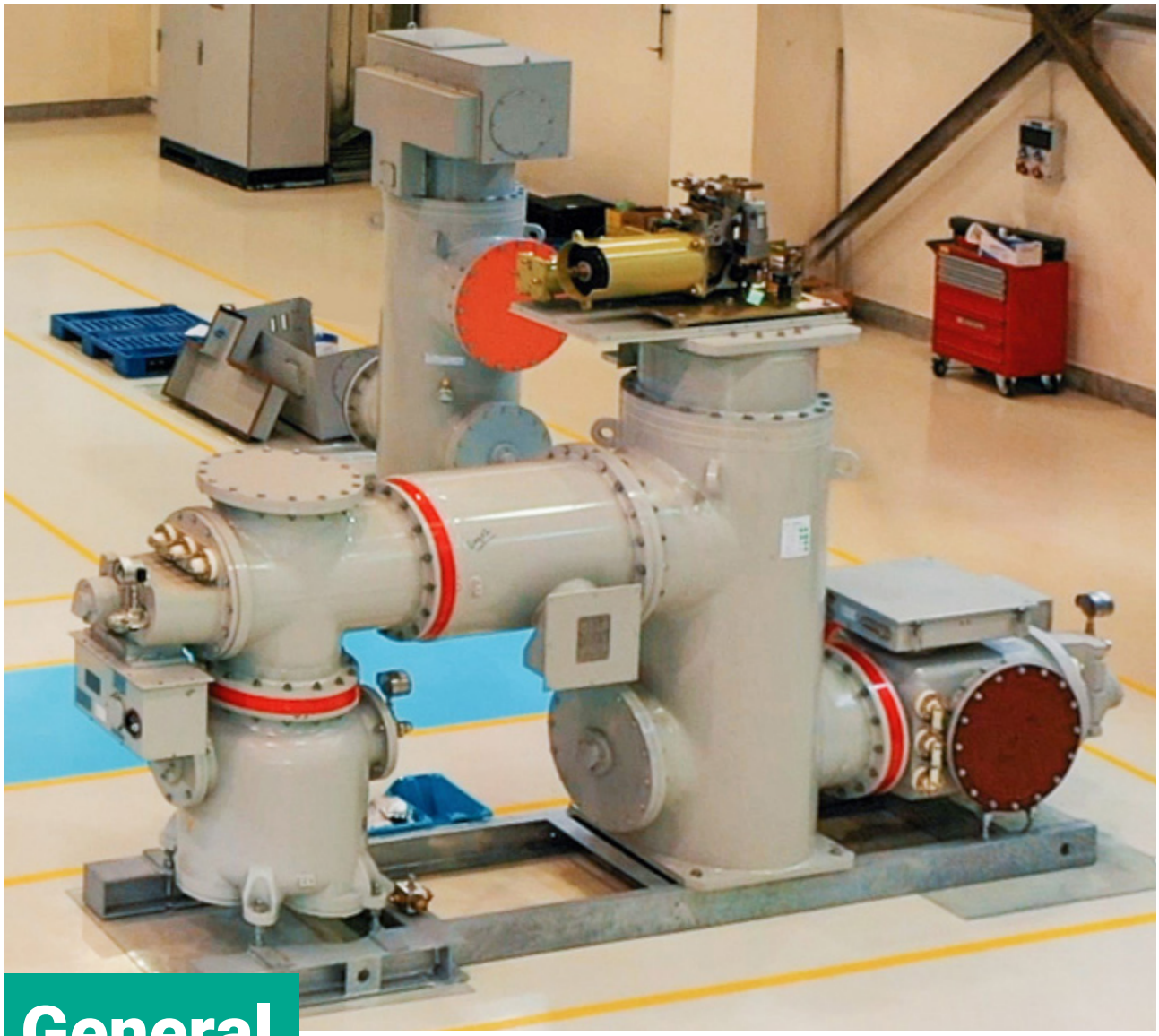
Chabahar 63 kV GIS
Client : **SBREC**



Chamran 63kV GIS
Client : **EREC**



Azarbaijan Mobile 230kV GIS
Client : **AREC**



General

1. Introduction

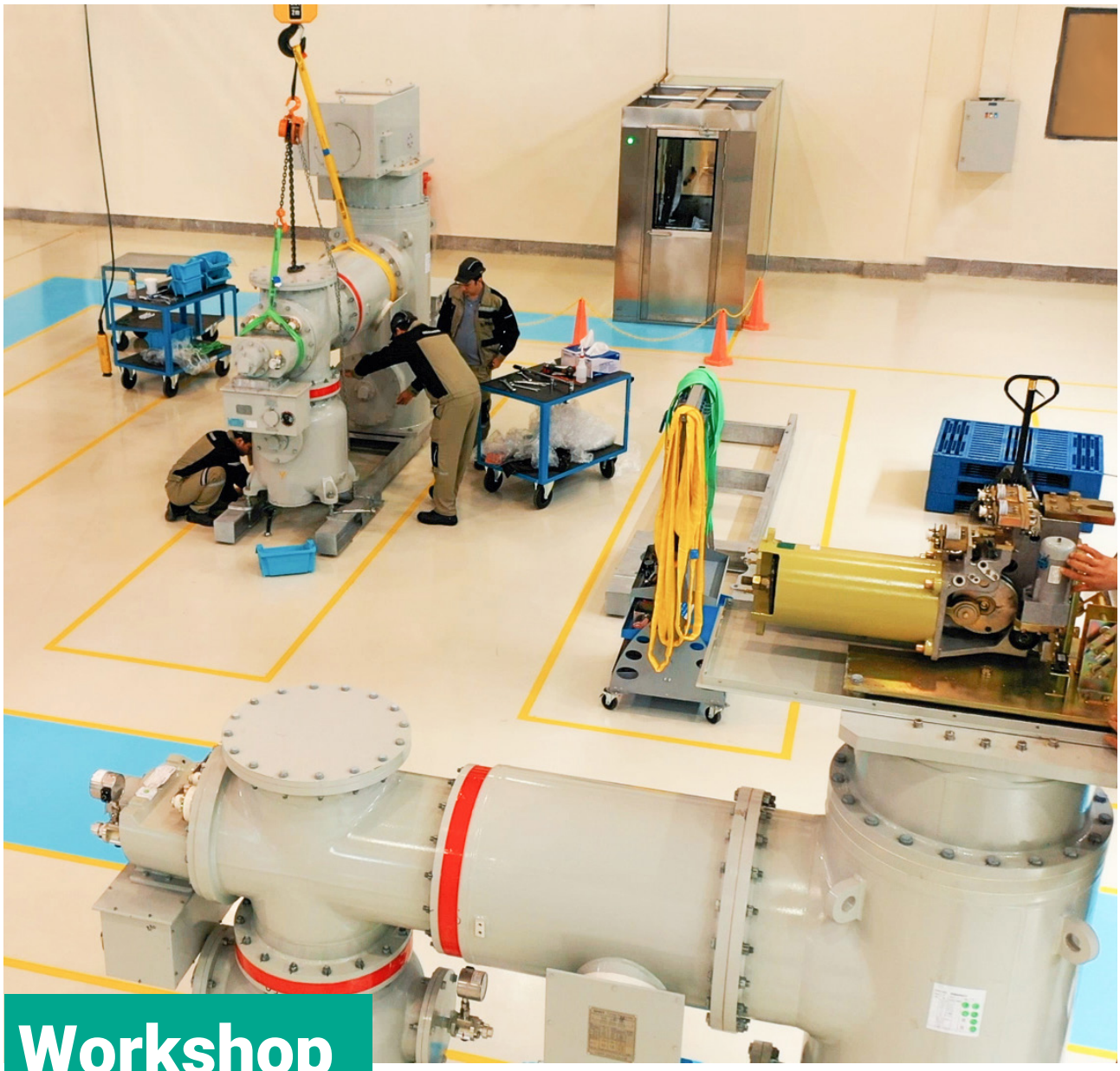
The Gas Insulated Switchgear (GIS/HGIS) is composed of the major equipment used in a substation such as circuit breaker, disconnector, earthing switch, voltage transformer and surge arrester in a grounded metallic enclosure. GIS complies to IEC standard 62271-203.

2. Application

- GIS can be used in the special power stations or the following areas besides open substation as:
- Substation in city: suitable for cities with large population.
- Contaminated region: suitable for pollution or corruptive area, such as seaside, mining area and chemical plant
- Hydropower station: suitable for underground substation.
- GIS greatly enhances performance and reliability and save space as well.

3. Main Feature

- Maximum safety
- Compact but accessible
- Field-proven reliability
- Maximally meet the requests of customer.
- Strong anti-seismic capacity.
- Less maintenance or free maintenance.
- Featured products with new design.



Workshop

Technolog, Know-How, experience and total HV substation deep knowledge combined in PSP manufacturing in GIS factory. More than 600 bays supplied and energized for 50^{+} domestic and overseas clients and the experience imprinted in PSP Know-How based companies league. PSP has a unique supervisory and test team holding certificates who have installed and energized almost all GIS brands such as AREVA, ALSTOM, GE, SIEMENS, ABB, XIAN, CHINT, TAIKAI, HITACHI, VATECH, etc.

PSP owns unique western European brands test facilities in middle east and GIS such as 550 kV HV test transformer, filling and vacuum systems, SF6 gas analysers, mechanical test unique systems, leakage test area and contact resistance test device. Total manufacturing workshop area is 6000 m^2 under condition of completely closed, constant temperature and dust-free standard.



GIS Assembly Workshop





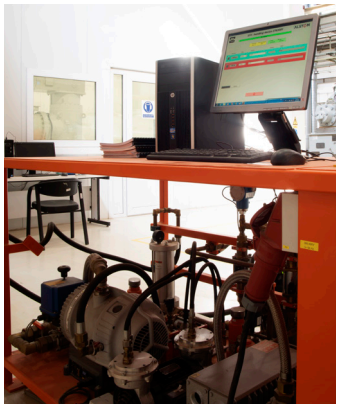
Testing facilities















Air-shower room



145kV Gas Insulated Switchgear (GIS)

1. Standard: IEC 62271-203

2. Typical Feature

2.1 Great Breaking Character of Circuit Breaker

The circuit breaker adopts the self-extinguishing principle; it can achieve three-pole linking operation by only adopting a spring mechanism with small operating power.

2.2 Compact Design

- Adopt the advanced three-position switch, less parts, simple structure, small space and high reliability.
- Adopt the advanced PLC intelligent control system, reduce the secondary elements, shrink the volume of cabinet greatly.
- The width of the bay is only 0.8m.

2.3 High Reliability of Mechanism

The circuit breaker adopts a spring mechanism with small operate power, and the three-position switch adopts electric operating mechanism.

2.4 Convenient Transportation and Installation

It can be transported as bigger unit and it is easy to install.

2.5 High Reliability and Maintenance

No maintenance under normal condition.

3. Technical Parameters

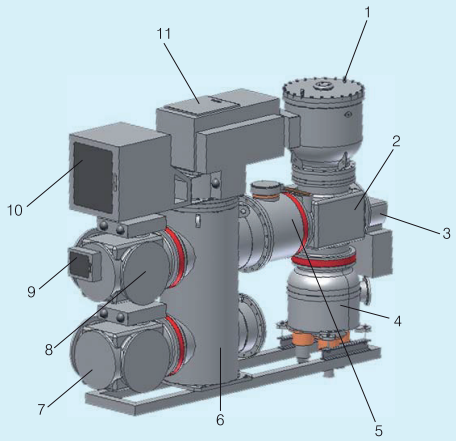
Description			Unit	Paramters
Installation				Indoor or outdoor
Temperature			(°C)	-40 ~ +55
Rated voltage			kV	145
Rated current/main bus rated current			A	2500/3150
Rated frequency			Hz	50
Rated short-time withstand current			kA/s	40/4
Rated peak withstand current(peak)			kA	100
Rated insulation level	Rated power frequency withstand voltage for 1min	To earth/between poles	kV	275
		Open contacts	kV	315
	Rated lightening impulse withstand voltage(peak)	To earth/poles to earth	kV	650
		Open contacts	kV	750
SF6 zero gauge pressure rated power			kV	108
Radio influence level(at 1.1 times rated pole voltage)			μV	≤500
Partial discharge(full bay)			pC	≤5
Rated SF6 pressure (20°C)	Breaker	Rated voltage	MPa	0.60
		Alarm pressure	MPa	0.55
		Blocking pressure	MPa	0.50
	Other gas room	Rated voltage	MPa	0.50
		Alarm pressure	MPa	0.45
SF6 annual leakage rate			%	≤0.5
Short circuit current of fault making earthing switch (peak)			KA	100
Rated breaking short circuit current of circuit breaker			KA	40

4. Structure

4.1 General Structure

See 145kV GIS general structure in the following diagram:

Fig.1 3D Structure diagram of 145kV GIS



1. Voltage transformer
2. Outgoing and incoming three-position switch
3. Fault-making earthing switch
4. Cable terminal
5. Current transformer
6. Circuit breaker
7. Busbar three-position switch 1
8. Busbar three-position switch 2
9. Touch-screen
10. Intelligent control cubicle
11. Spring operating mechanism

4.2 Circuit Breaker Module

The circuit breaker is of three-pole common box typed structure and consists of two components: Interrupter unit and operating mechanism.

4.2.1 Interrupter Unit

The interrupter unit adopts the principle of self thermal expansion and the compression arcquenching principle.

Fig.2 Circuit breaker

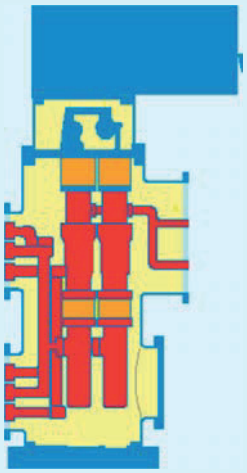
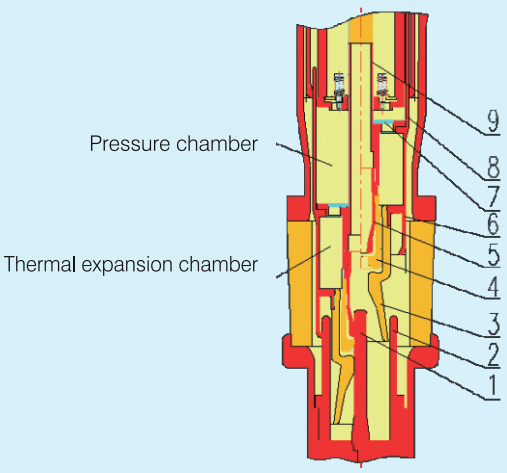


Fig.3 Principle diagram of interrupter unit



1. Static arcing contact
2. Main static contact
3. Big nozzle
4. Small nozzle
5. Moving arcing contact
6. Main moving contact
7. One-way valve
8. Pressure cylinder
9. Pull rod

4.2.1.1 Interruption of Short-circuit Current

When the circuit breaker opens , the drag rod (9) moves upward , and drives the pressure cylinder (8), the main moving contact (6), the big nozzle (3), the small nozzle (4) and the moving arcing contact (5) which are connected to it to move upward as well. During the breaking operation, the main moving contact (6) and the main static contact (2) open first and the current commutates on the still closed arcing contacts (1) & (5). The operation progresses on and the arcing contacts are separated and then an arc develops between the arcing contacts (1) & (5). As the breaking current during the operation is very big , the arc energy between the arc contacts is relatively very strong. Then the thermal current in the arc area enters the thermal expansion chamber and begins heat exchange, heats up the SF6 gas and produces thermal expansion, and low-temperature high-pressure gas is produced in the upper zone and the thermal expansion chamber, which makes the pressure in the thermal expansion chamber bigger than that in the pressure cylinder, and this results in the close of the one-way valve (7). The thermal expansion chamber fully takes advantage of the "blocking effect" of the arc, when it comes to zero-current, the high pressure gas in the thermal expansion chamber flows into the contact gap and extinguishes the arc.

4.2.1.2 Interruption of Load Current

When breaking small current of several thousand Amps, the arc energy is small and the pressure formed in the thermal expansion chamber is low. Meanwhile the drag rod (9) drives the pressure cylinder (8), the main moving contact (6), the big nozzle (3), the small nozzle (4) and the moving arcing contact (5) move upward, and leads to a pressure rise in the pressure cylinder. Because the pressure in the pressure cylinder is bigger than that in the thermal expansion chamber, the one-way valve (7) opens and the gas flows out and flows into the contact gap by the compressed SF6 gas and the arc extinguishes when it comes to zero-current.

4.3 Three-position Switch Module (three-phase common box)

Three-position switch includes bus three-position switch and incoming and outgoing feeder three position switch, they have the common structural features as follows:

- The disconnector and the earthing switch share a mechanism and a moving contact. Using one electric mechanism can achieve the operation of disconnector close-disconnector open/earthing switch open earthing switch close, which achieves less parts, small volume, simple structure and high reliability.
- Adopt three-position switch electric mechanism imported from Japan, which can also be manually operated. It is of compact design, small volume and high reliability.

4.3.1 Bus Three-position Switch

- The disconnector closes when the moving contact moves towards lefl and plugs into the static contact of the disconnector;

the earthing switch closes when the moving contact moves towards right and plugs into the static contact of the earthing switch.

- The conductor connects the static contact of the disconnector with the middle conductor on the basin- type insulators. It can be used as inside conductor of disconnector/earthing switch as well as used as a main bus, that's also why the GIS has not a separate main bus unit. This greatly Simplifies the structure, saves space and increases product reliability.

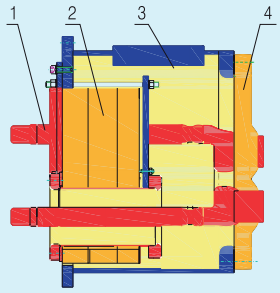
4.3.2 Incoming and Outgoing Feeder Three-position Switch

The position in the figure is the middle position of disconnector open/earthing switch open. The disconnector closes when the moving contact moves towards right and plugs into the static contact of the disconnector; the earthing switch closes when the moving contact moves towards left and plugs into the static contact of the earthing switch. It almost has the same structure with the disconnertor, except it has a fault making earthing switch. The static contact of the fault making earthing switch is connected with the conductor, and the moving contact is connected with the enclosure through the insulator as well as connected with the mechanism through four dog bone drive system. The fault making earthing switch has special electric spring operation mechanism with capability of breaking the short circuit current for more than Slimes.

4.4 Current Transformer(CT) Module

- Adopt toroidal core.
- The secondary winding is epoxide resin casing.
- Three-phase common barrel type.
- Various types of class measurement and protective winding with different class precision, rating and capacity are available on customer requirements.
- Primary winding is the main circuit conductor.
- Outgoing feeder of the secondary winding is led out through the terminal box to the control cubicle (PLC).

Fig.4 Current transformer

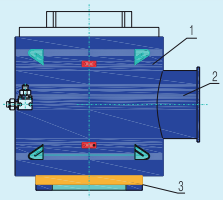


1. Primary winding
2. Secondary winding
3. Terminal box
4. Basin-type insulator

4.5 Voltage Transformer(PT) Module

- Voltage Transformer (also called Potential Transformer) is electromagnetic-type transformer.
- Three-pole common barrel type and single-pole type is available.
- Various types of secondary winding and spare winding available.
- PT can be installed at optional positions in the GIS through basin-type insulator.

Fig.5 Voltage transformer

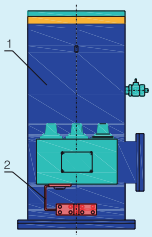


1. Voltage transformer
2. Terminal box
3. Basin-type insulator

4.6 Surge Arrester Module

- Metal Oxide (MO) resistor wafer type valve.
- Three-phase common barrel type.
- As the over-voltage protection device, surge arrest-ers are usually installed on the incoming side of a GIS, and are connected with other modules through basin-type insulators.
- Side-mounted and roof-mounted structures available.

Fig.6 Surge arrester



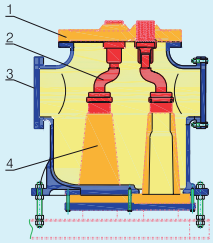
1 Surge arrester
2. Terminal box

4.7 Terminal Module

4.7.1 Cable Sealing End(CSE) Module

- Through cable Sealing End(CSE) box , all kinds of high voltage cables can be connected with GIS.
- Epoxy resin or jack-in type available.
- Primary conductor can be removed to separately do high-voltage test of GIS cable.
- Designed in accordance with IEC62271-209 standard.

Fig.7 Cable sealing end

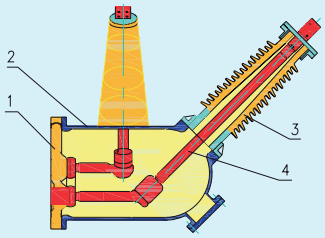


1. Basin-type insulator
2. Conductor
3. Shell
4. Cable Sealing End(CSE)

4.7.2 SF6/Air Bushing Module

- When overhead line is used in GIS as the incoming and outgoing feeder, SF6/air bushing is adopted.
- The structure of SF6/air bushing is three-pole spilt phase. The three-phase common barrel type changes to individual pole at the bushing position, then connected to the outside.

Fig.8 SF6/Air bushing

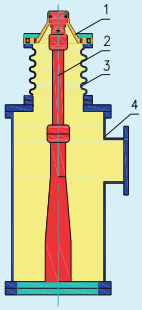


1 Basin-type insulator
2. Shell
3. Porcelain
4. Conductor

4.7.3 SF6/Oil Bushing Module

- The structure of SF6/o I bushing is three-pole split barrel.
- Transformer is connected with GIS through SF6/oil bushing.
- Bellows are used to adjust the thermal expansion and contraction and installation errors

Fig.9 SF6/Oil bushing



1. Basin-type insulator
2. Conductor
3. Bellows
4. Shell

4.8 Maximally Adapt to Users' Requirements

- All the components of GIS, such as disconnector, circuit breaker, CT and other connected components are of standard modular structure.
- Each component structure is simplified and pruned to meet clients' requirements of arrangement under different conditions.
- GIS can be designed to be more reliable, more compact, more convenient to install and maintain, easier to achieve the expansion of docking and to maximally meet user's needs.



252kV Gas Insulated Switchgear (GIS)

1. Standard: IEC 62271-203

2. Typical Feature

2.1 Great Breaking Character of Circuit Breaker

The circuit breaker adopts the self-extinguishing principle; it can achieve three-pole or one-pole operation by only adopting a spring mechanism with small operating power.

2.2 Compact Design

- Adopt the advanced three-position switch, less parts, simple structure, small space and high reliability.
- Adopt the advanced PLC intelligent control system, reduce the secondary elements, shrink the volume of cabinet greatly.

2.3 High Reliability of Mechanism

The circuit breaker adopts a spring mechanism with small operate power, and the three-position switch adopts electric operating mechanism.

2.4 Convenient Transportation and Installation

It can be transported as bigger unit and it is easy to install.

2.5 High Reliability and Maintenance

No maintenance under normal condition.

3. Technical Parameter

3.1 Main GIS Technical Parameters

Description		Unit	Parameter
Installation			Indoor or outdoor
Temperature		(°C)	-40 ~ +55
Rated voltage		kV	252
Rated frequency		Hz	50
Rated current		A	2000~4000
Rated short-time withstands current ,3s		kA	50
Rated peak withstands current(peak)		kA	125
Rated short time power frequency withstands voltage, 1min		kV	460
Rated lightening impulse withstands voltage(peak)		kV	1050
Power frequency withstands voltage under zero gauge pressure, 5min		kV	189
Rated SF6 pressure (20°C)	Circuit breaker gas room	MPa	0.72
	Other gas room	MPa	0.68
SF6 annual leakage rate		%	≤0.5

3.2 Main Technical Parameters of Circuit Breaker

Description		Unit	Parameter
Rated short-circuit breaking current		kA	50
Rated short-circuit making current(peak)		kA	125
First phase breaking factor			1.5
Rated short time power frequency withstand voltage,1min	Open contacts	kV	530
	To earth	kV	460
Rated lighting impulse withstand voltage(peak)	Open contacts	kV	1200
	To earth	kV	1050
Power frequency withstand voltage under zero gauge pressure, 5min		kV	189
Rated operating sequence			O-0.3s-CO-180s-CO
Entire breaking time		ms	≤60
Closing time		ms	≤110
Opening time		ms	≤30
Operation mechanism			Spring

3.3 Main Technical Parameters of Disconnector and Maintenance Earthing Switch

Description		Unit	Parameter
Rated short time power frequency withstand voltage,1min	Open contacts	kV	530
	To earth	kV	460
Rated lighting impulse withstand voltage(peak)	Open contacts	kV	1200
	To earth	kV	1050
Power frequency withstand voltage under zero gauge pressure, 5min		kV	184
Closing time		s	≤4
Opening time		s	≤4

3.4 Main Technical Parameters of Fault Making Erathing Switch

Description	Unit	Parameter
Rated short-circuit making current(peak)	kA	125
Closing time	s	≤4
Opening time	s	≤4

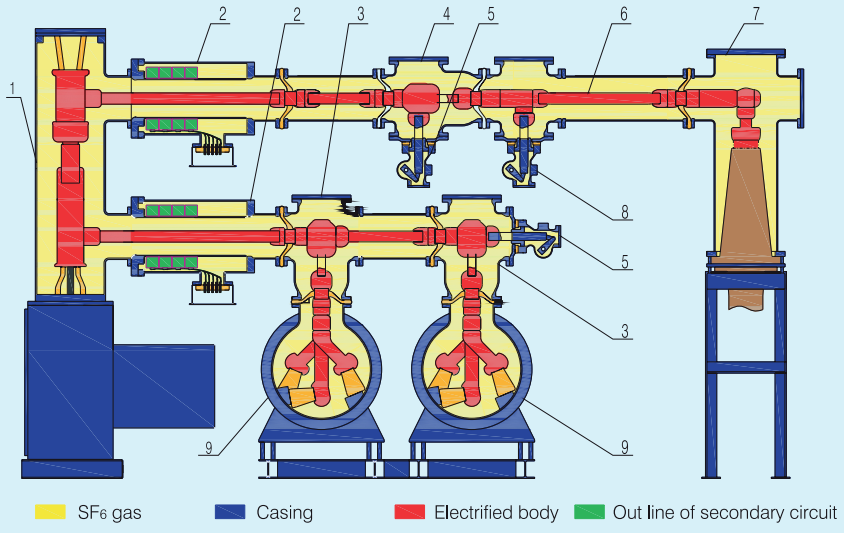
3.5 Main Technical Parameters of Bus

Description	Unit	Parameter
Rated current	A	2000 - 4000
Type of casing		main busbar three-pole common box/ tapped bus three-pole split box

4. Structure

Modular design makes the structure varified as per different arrangements

Fig.1 Sectional diagram of one bay



1. Circuit breaker
2. Current transformer
3. Disconnector (right-angle type)
4. Disconnector (line type)
5. Earthing switch for repairing
6. Branch bus
7. Cable Sealing End(CSE) box
8. Fault making earthing switch
9. Main bus

5. Standard Module

5.1 Circuit Breaker

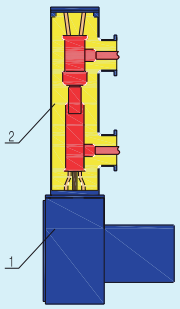
The circuit breaker is the core component of GIS.

The circuit break is compose d of two parts: interrupter unit and spring operating mechanism.

5.1.1 Interrupter Unit

The interrupter unit is self-extinguishing circuit breaker, during the operation of circuit to arc-quenching. Adopting spring operating mechanism of small operate power because it needs less operating power.

Fig.2 Circuit breaker



1. Spring operating mechanism
2. Interrupter unit

5.1.2 Operating Mechanism

Spring stored energy operation mechanism is provide energy to opening or closing operation of circuit breaker. The mechanisms sealed in mechanism cabinet.

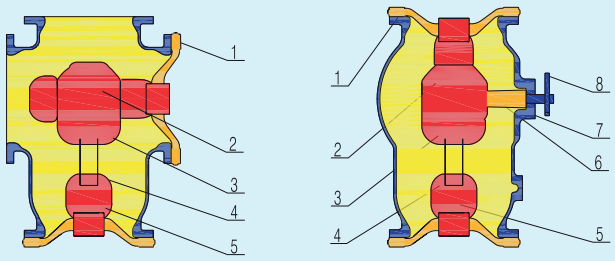
Features:

- Compact designed.
- The circuit breaker can accomplish more than 3000 times opening and closing operation.
- No noise operation.

5.2 Disconnector

- Able to can open or close the bus charging current, low inductive current and bus switching current.
- High insulation level at breaks
- Strongly commonality. All of the spare parts of the two types of disconnector switch are general service expect type of installation.
- Can be operated by three-pole linking of electric mechanism or manual operation.

Fig.4 Disconnector



A. Right-angle type disconnecting switch

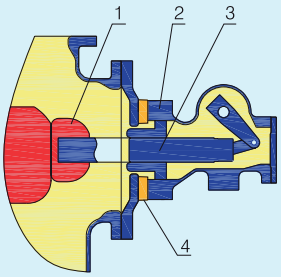
B. Line type disconnecting switch

1' Basin type insulator
2' Moving contact assembly 3' Moving side shield
4' Static side shield
5' Static contact assembly 6' Insulation pull rod
7' Shaft seal
8' Connecting lever

5.3 Earthing Switch

- The fault making earthing switch can make the short-circuit current, it also can open or close the electrostatic induction current and electromagnetic induction current.
- Strongly commonality. Except the different service foundation of two types of earthing switch, they are the same in internal structure, and the spare parts of the two types of earthing switch are general service.
- Resistance measurement of GIS main circuit, measurement of mechanical characteristic of circuit breaker and performance test of current transformer is come true through earthing switch.

Fig.5 Earthing switch



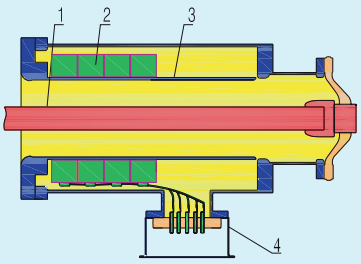
1. Static contact assembly
2. Shell
3. Moving contact assembly
4. Insulation flange

Accordingto the different requirement of arrangement, earthing switch for repair can be installed on disconnecting switch or bus. Fault making earthing switch is usually be installed on incoming and outgoing line. The high potential of GIS are safe grounding through earthing switch for security of people and equipment during installing and repair.

5.4 Current Transformer

- Toroidal core, secondary circuit is epoxide resin packaged.
- Variety quantity of class of measurement and protective winding available.
- According to the requirement of main wiring of secondary circuit, there is different ratio of transformer, class of accuracy and capacity.
- Electromagnetic induction type.

Fig.6 Current transformer



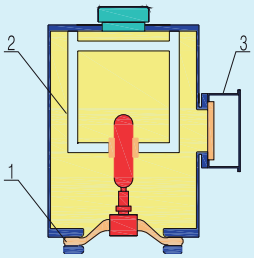
1 Primary conductor
2. Winding
3. Internal shield
4. Terminal box

The current transformer can be installed on one side or two sides of circuit breaker, or any position of incoming and outgoing line. The primary winding consists of high voltage conductor. Outgoing feeder of secondary winding is be lead-out through sealed terminal which be installed on shell.

5.5 Voltage Transformer

- Electromagnetic-type transformer.
- Variety of secondary windings and spare windings available.
- According to the requirement of customer, secondary winding has different ratio of transformer, class of accuracy and capacity.
- Installed on any position of GIS.

Fig.7 Voltage transformer



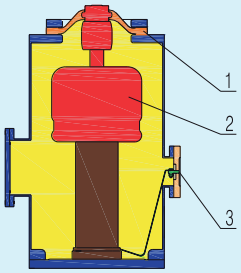
1. Basin type insulator
2. Voltage Transform
3. Terminal box

Voltage transformer has an independent gas room of SF6. It can be installed vertically, upward and downward.

5.6 Metal Oxide Surge Arrester

- Adopt metal oxide resistor wafer.
- Installed on any position of GIS.

Fig.8 Metal oxide surge arrester



1. Basin type insulator
2. Core of surge arrester
3. Earthing Terminal

As the overvoltage protective device, surge arrester is installed on incoming side or any position of GIS. The surge arrester is an independent gas room. The core of surge arrester consists of metal oxide resistor wafer which has obvious nonlinearity of current and voltage, connect with GIS through gas insulator. The equipment is installed on casing of surge arrester for monitor and control.

5.7 Bus

Main bus type and branch bus type.

The main bus is three-pole common box, and the branch bus is three-pole split box type.

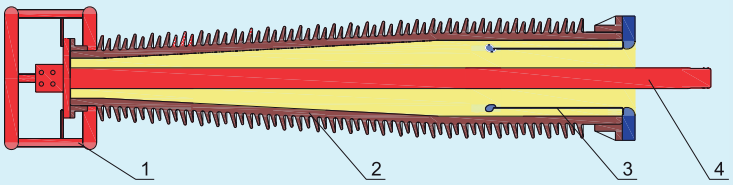
5.8 Terminal Component

The GIS connects with the overhead line, transformer, reactor or cable through following component: SF6-air bushing , cable terminal box and transformer terminal box (SF6 oil bushing).

5.8.1 SF6-air Bushing

GIS connects with open equipment or overhead line through SF6-airbushing. It has considered the air insulation distance and pollution degree that design of length of bushing, umbrella type and creepage distance, and it is suitable for different area. The insulation distance of three-pole bushing had been considered during the design.

Fig.11 SF6-air bushing



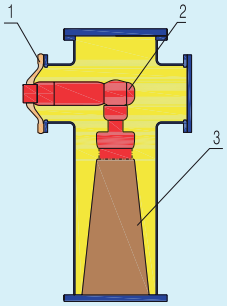
1. Grading ring
2. Porcelain bushing
3. Internal shield
4. Central conductor

5.8.2 Cable Sealing End(CSE) Box

Through cable terminal box, it can joint all kinds of high voltage cable to GIS. The design and scope of supply of cable terminal box comply with the requirements of IEC62271-209.

The connection conduct between GIS and cable terminal is removable, GIS and cable can do test separately.

Fig.12 Cable terminal box



1. Basin type insulator
2. Removable conductor
3. Cabele terminal

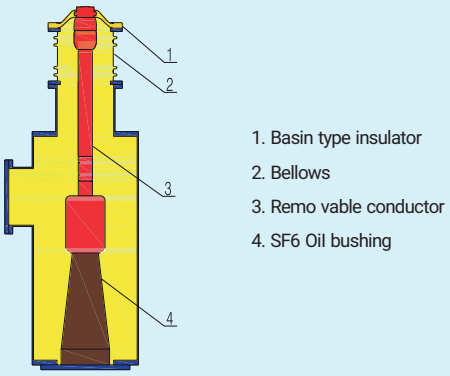
5.8.3 Transformer Termination Box (SF6-oil Bushing)

The transformer terminal box connects the oil insulation transformer or reactor. The design and scope of supply of transformer terminal box tallies with the requirements of IEC 62271-306.

The connection conduct between GIS and cable terminal is removable, GIS and cable can do test separately.

In order to compensate the error, the bellows is usually installed on between transformer terminal box and GIS.

Fig.13 Transformer terminal box



6. Controlling, Interlocking, Monitoring

6.1 Local Control Cubicle

The circuit breaker, disconnecting switch, control of earthing switch, position indicator and the monitor of SF6 are all concentrate in local control cabinet of space.

The main function of control cabinet:

- The local operation of circuit breaker, disconnecting switch, earthing switch come true, and operation choice of remote control room comes true.
- Transmite all of the signal to center control room and protective device
- Setting a mimic diagram of primary main wiring, position indicator of circuit breaker, disconnecting switch and earthing switch.
- Setting local operation switch of circuit breaker, disconnecting switch and earthing switch.
- Ligthing alarm annunciator of SF6, monitor the SF6 state of every gas room.
- Connect with circuit breaker, disconnecting switch, earthing switch, current transformer and terminal of voltage transformer.

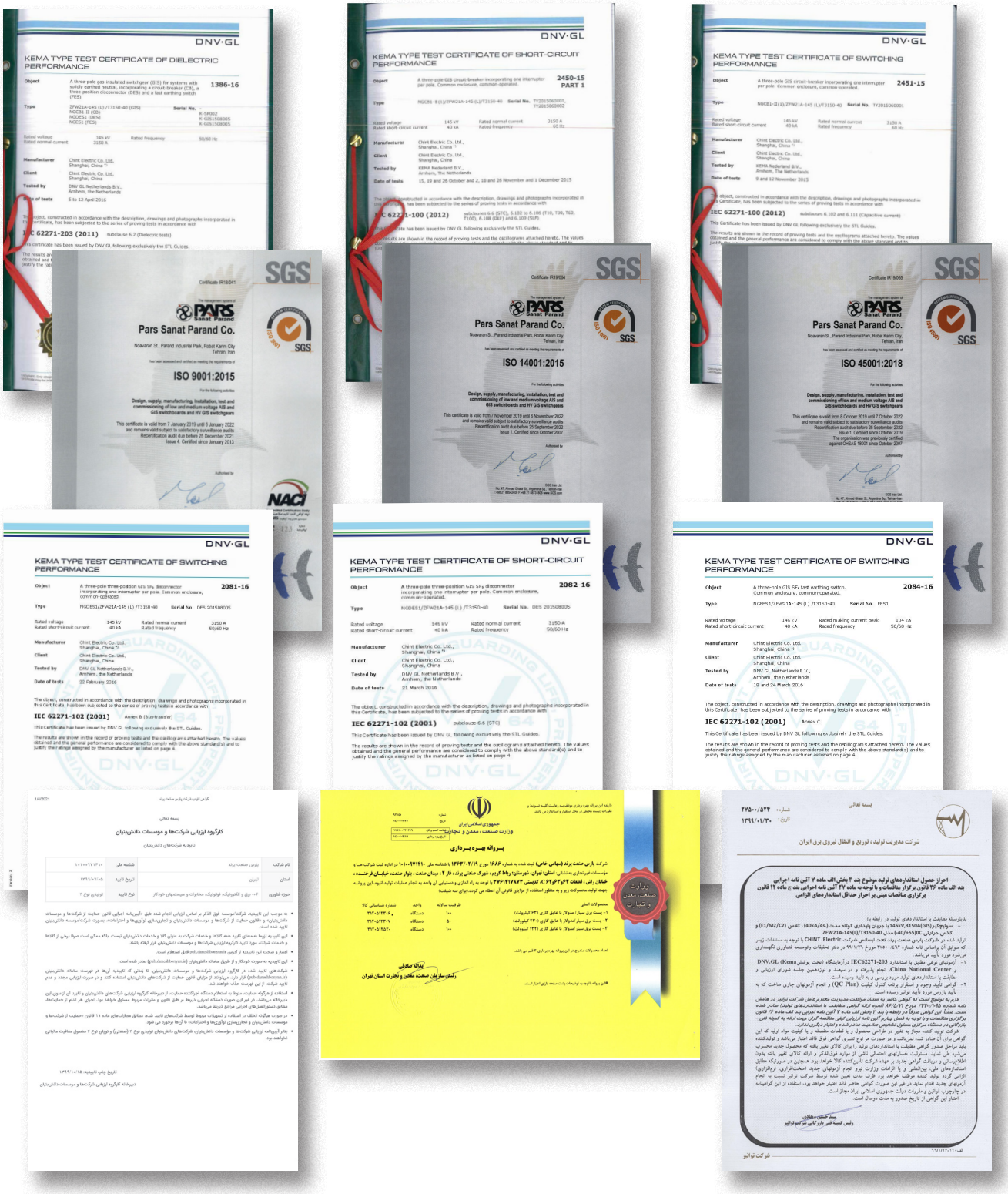
6.2 Interlocking

Electric interlock is set during circuit breaker, disconnecting switch and earthing switch, it can avoid incorrect operation effectively. So people can operate the circuit breaker, disconnecting switch and earthing switch correctly in main control room or local position.

6.3 SF6 monitoring

The space of GIS is separated to several unattached gas room by basin insulator, the SF6 monitor are installed in every gas room. And it also has independent aeration interface. The signal is transmitted to local control cabinet through cable. When the SF6 in the gas room is abnormal, the alarm signal is sent out. The circuit breaker also has block-signal of SF6 pressure reduce operation.

Certificates





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