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Zhejiang Greenpower Electric Co., Ltd
Zhejiang GreenPower I&E Co., Ltd
Professional Power Equipment Provider

GreenPower

GPN2N–40.5kV

Non–SF_6 Green Gas Insulated Metal–enclosed Switchgear

Contact us

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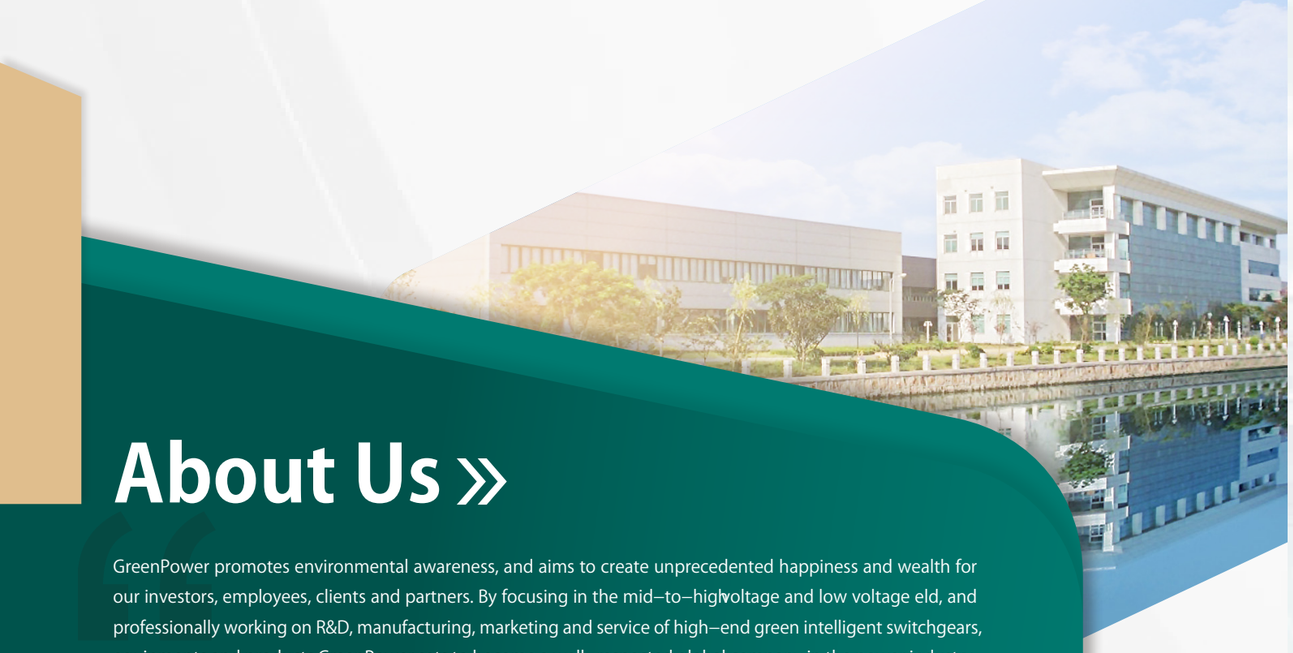


About Us »

GreenPower promotes environmental awareness, and aims to create unprecedented happiness and wealth for our investors, employees, clients and partners. By focusing in the mid–to–highvoltage and low voltage eld, and professionally working on R&D, manufacturing, marketing and service of high–end green intelligent switchgears, equipments and products.GreenPower sets to become a well–respected global company in the power industry

GreenPower, is jointly established by a number of state–ownedexcellent industrial electrical professional manufacturers, we committed to meet the procurement needs of clients. It is a professional procurement service provider with entity of industrial electrical.

GreenPower provides ONE–STOPsolutions service for all customers in the International area. It is located in the time–honoredelectrical industrial city, a collection of worldclass brand of industrial electrical products,excellent brand of domestic electrical products as the basis.

Innovative business philosophy, strong professional supply team, expert technical guidance, advanced Information network management platform, fast logistics, which makes GreenPower as your procurement expert by your side.

GreenPower adheres to its own brand and multi–brandintegration, marketing dierentiated development strategy. The products involving low voltage, medium voltage and high voltage transmission and distribution products and industrial automation products.

It covering all aspects of distribution, logistics, warehousing, professional and technical engineering services, systems integration and complete sets of manufacturing. Stable business foundation for cooperation with customers and suppliers, and has established a good reputation to maintain its leading position in the market competition.

Human quests for transcendence, with transcendence we make progress, when the pursuit of unlimited become a belief, our dream began to realize.

Hard–working,dedicated GreenPower people, will be adhering to its past glory, beginners mind, let go sailing, to face the fierce competition in the future, and always help customers make the best choice, and strive to become the best and most reliable procurement service provider in the eld of industrial electrical.

Contents

General

SF_6 is one of the six green-house effect gases stipulated in Kyoto Protocol, its GWP is 23900 times of carbon dioxide, which can last for around 3200 years in atmosphere. SF_6, as the main insulating and breaking media for HV electrical equipments, its emission has accounted for 80% of the total volume. Hence, it will play an important role for the development of global power industry to limit and control the use and emission of SF_6 gas.

Our company has been very keen on the sustainable development strategy of low carbon and economy, and dedicated for the R&D, manufacture and sale of environmentally friendly MV gas insulated switchgear for long term. On the basis to replace SF_6 by the mixture of N_2 and SF_6 for 12-40.5kV type products, the N2N Non-SF_6 gas insulated switchgear has been developed successfully, which has used the low-pressure Nitrogen as insulation gas as well as the combined gas and partially solid interface insulation theology, to innovate the Non-SF_6 gas technology. This has brought the genuine concept of green environmental protection.

Product application

The product is applied for 40.5kV T&D power system, receiving, distributing the energy and making the control, measurement, protection and intelligent monitoring during the normal or fault operation of the system, especially for the important projects in the metropolitan with the limited land resources, underground place, skyscraper, as well as severe areas with high altitude, high salt fog, high dust and high humidity. It plays more economic role in those countries which limit the carbon emission. The product is of the high stability, cost efficiency and Nitrogen gas insulation with lower pressure, which has fully utilized the forecast and warning feature of gas, to isolate the influence from the environment by overcoming the uncontrolled and unpredictable of solid insulation to the partial discharge, which enables the product of high reliability, maintenance free, less space occupation, energy saving, material saving and land saving.

Normal service conditions

- Complying with the following limitation values according to GB3906, DL/T404 and IEC 62271-200;
- Ambient air temperature:
  Maximum air temperature: +40℃
  Minimum air temperature: -25℃
  Daily average maximum temperature: +35℃
- Humidity:
  Daily average value of relative humidity: ≤95%
  Monthly average value of relative humidity: ≤90%
  Daily average value of water vapor pressure: ≤2.2×10^{-3}MPa
  Monthly average value of water vapor pressure: ≤1.8×10^{-3}MPa
- Altitude: ≤ 1000m
  The ambient air is not significantly polluted by dust ,smoke , corrosive and/or flammable gases ,vapours or salt .

Special service conditions

The product can also be applied for many special service conditions. In case the service conditions exceed the normal service conditions, which are out of the standard GB 11022 and IEC 62271-1, please consult with the manufacturer in advance for confirmation:

- Altitude higher than 1000m
- Higher environmental temperature
- Lower environmental temperature
- Others special environmental conditions

Product advantages

Environment-friendly

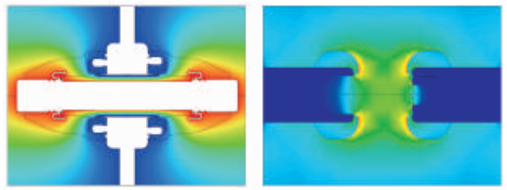
Pure nitrogen insulation and vacuum breaking technology have been used on N2N-40.5kV type switchgear to replace SF_6 completely and realize green house solution.

High-performance

The high-voltage components such as inner-cone bushing, 3-position switch, embedded pole and busbar system etc. have adopted the design specially for nitrogen gas insulation characteristic:

- Gas gap insulation design
- Interface insulation design

This leads the switchgear high insulation performance and function minimum relative gas pressure down to zero. The low-pessure design extends the duration of gas leaking to atmosphere pressure. As 78% components of air is nitrogen , and 21% of the air is oxygen, it will not reduce the insulation level in long time, so as to guarantee the rated insulation level of the switchgear, which provide enough time for the maintenance and repair plan arrangement, and which increase the operation reliability of the equipment.



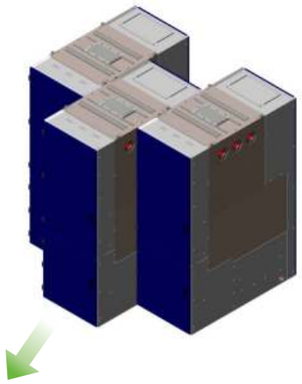
Smart prefabricated substation

- The switchgears can be installed in the new generation prefabricated substation to form the compact, integrated and comprehensively smart design with the modular transportation so as to simply the field installation and commission work for more efficiency;
- The switchgear for every busbar can be installed in the outdoor prefabricated cabinet of container type for the necessary sectionalizing requirements, which will be beneficial for the future extension, liaison, standardization and modularization;
- Compact general arrangement, which is compatible with the overall arrangement of substation.

Product advantages

The middle panel withdrawable

- Silicon rubber busbar connector is used to connect the panels in between ;
- When replacing or maintaining middle panel, other neighbor panels don't need to be taken away.



Modular design, flexible extension and arrangement

- Provide flexible extension and combination between diverse function modules such as incoming, outgoing, sectionalizer, busbar riser panel etc;
- Gas tank assembled in factory, no need to deal with the gas on site.

High safety and reliability

- World advanced designing concept, with world first-class manufacturing and testing facilities, such as laser welding, laser cutting and helium detection system;
- The gas tank is welded by 3mm stainless steel plate by laser technology with the fully enclosed structure, applicable for the severe areas of high altitude, high humidity and high dust etc;
- The rated gas pressure 0.12 MPa (abs. 20℃) of the gas tank ensures the small leakage rate as well as the insulation level and breaking capability under zero gauge pressure;
- Excellent erosion-resistant capability to pass the salt spray test up to 1000 hours, which is applicable for the high salt fog environment;
- The mechanical and electrical interlocking between vacuum circuit breaker and 3-position switch ensures the breaking and making of the working current and fault current implemented by vacuum interrupter, which limit the arc within the vacuum interrupter, so as to avoid the degradation of insulation gas;
- The HV interface insulation technology is used to ensure all the HV components are fully insulated with plug-in design;
- Smart control and protection unit has fully realized the function of smart automation and digitalization with its strong function on control, protection, measurement and communication.

Typical application

▲ Grand Theatre

▲ Subway

▲ Maglev Train

▲ Substation

▲ Architecture

◀ Bridge

▲ Harbor

▲ Railway

◀ Highway

▲ Petrochemistry

Complied standards

GB/T11022-2011(IEC62271-1)	High-voltage switchgear and controlgear- Common specifications
GB3906-2006(IEC62271-200)	AC metal-enclosed switchgear and controlgear for rated voltages above 3.6 kV and up to and including 40.5 kV
GB1985-2004(IEC62271-102)	Alternating current disconnectors and earthing switches
GB1984-2003(IEC62271-100)	Alternating-current circuit-breakers
GB/T12706.4-2008(IEC60502-4)	Power cable with extrude insulation and their accessories for rated voltages for 1kV (Um=1.2kV) up to 35kV (Um=40.5kV)-Part 4： Test requirements on accessories for cables with rated voltage from 6kV (Um=7.2kV) up to 35kV (Um=40.5kV)
DL/T593-2006	High-voltage switchgear and controlgear –Common specifications
DL/T404-2007	AC metal-enclosed switchgear and controlgear for rated voltages above 3.6 kV and up to and including 40.5 kV
GB 1207-2006(IEC60044-2)	Inductive voltage transformers
GB 1208-2006(IEC60044-1)	Current transformers
GB/T 11032-2010 (IEC60099-4)	Metal-oxide surge arresters without gaps for a.c. systems

Technical specifications

No.	Item		Unit	Data	
1	Rated voltage		kV	40.5	
2	Rated current		A	1250	2500
3	Rated frequency		Hz	50	
4	Rated power frequency withstand voltage (eff.)	Between phases and to earth	kV	95	
		Across the isolating distance		118	
5	Rated lightning impulse withstand voltage (peak) (1)	Between phases and to earth	kV	185	
		Across the isolating distance		215	
6	Rated short-circuit breaking current		kA	31.5	
7	Rated short-circuit making current (peak)		kA	80	
8	Rated short-time withstand current		kA	31.5	
9	Rated duration of short-circuit		s	4	
10	Rated peak withstand current		kA	80	
11	Rated cable-charging breaking current		A	50	
12	Rated operating sequences			O-0.3s-CO-180s-CO	
13	Insulation gas			N_2	
14	Rated filling gas pressure		MPa	0.12	
15	Alarm pressure		MPa	0.11	
16	Minimum operating pressure		MPa	0.10	
17	Annual leakage rate		%/Y	<0.1	
18	Degree of protection	High voltage live parts		IP65	
		Low voltage compartment		IP4X	
19	Rated voltage of auxiliary circuit		V	DC24, 48, 110, 220 AC220	
20	Rated power frequency withstand voltage of auxiliary circuit (1min)		kV	2	
21	Dimensions	W	mm	800	900
		D	mm	⩾ 1700 (2)	
		H	mm	⩾ 2300 (3)	

Note:

1) The insulation level and breaking capability are tested under 0.1MPa of its minimum working pressure (abs. 20℃);
2) Subjected to the incoming/outgoing cable quantity, CT type and PT connection ect;
3) Subjected to the panel function.

Production facility and manufacturing process

NC Laser cutting process center

TRUMPF NC Laser cutting process center from Germany

High-voltage partial discharge laboratory

Fully shielded partial discharge laboratory, in which the partial discharge tests for complete panel and insulating parts can be made for quality control, thus to ensure the electrical endurance and insulation reliability under long-term operation.

Automatic helium detection system

The automatic helium detection process from Germany has been used to evacuate the gas tank from inside and outside in parallel, filling certain pressure of helium into gas tank. Apart from avoiding the deformation of gas tank, it can speed up the helium leakage so as to realize the leakage rate detection for the gas tank with higher accuracy. Different from the traditional testing method of helium Spary and helium Cover, this facility has used the positive pressure of helium detection with smallest molecule for more complete, accurate and sensitive detection on the thin-wall gas tank. The detection system has realized the automatic evacuation, filling and leakage detection in 15 minutes for each gas tank during mass production. The annual leakage rate for gas tank shall be less than 0.1% during its 30 years endurance life.

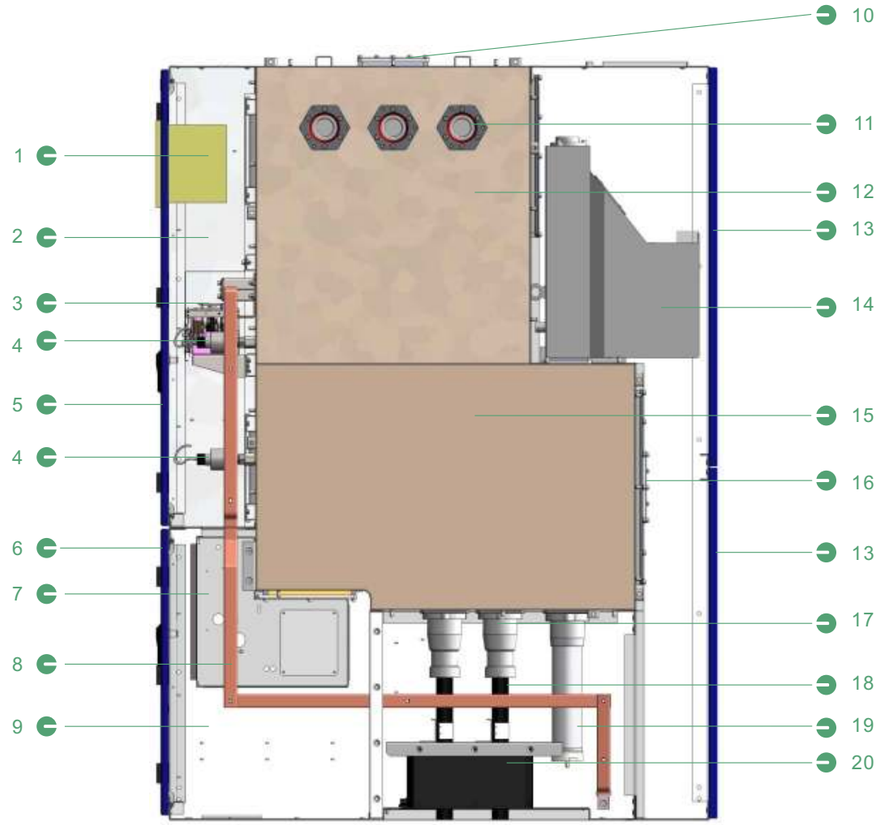
Automatic flexible manufacturing system

The state of art automatic flexible manufacturing system (FMS) has been well integrated the main traditional process (cutting, punching and bending) into complete automation for modern switchgear industry, including uploading, transiting, storing and downloading of the metal material, which has guaranteed the accuracy, compliance, utilization and efficiency of metal parts, and saved the human resources as well.

NC 3D-5A Laser welding system with helium protection

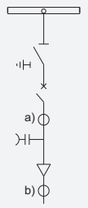
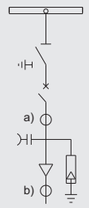
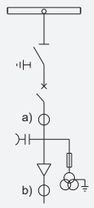
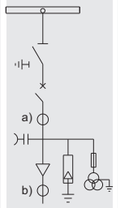
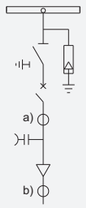
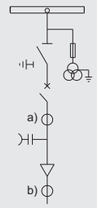
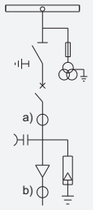
The world advanced laser welding process with high accuracy and energy has been used to weld the stainless steel plate into gas tank without flux, which has avoided the shortcomings during the traditional argon arc welding. This can ensure the tightness of the gas tank in the long-term climate change, and the annual leakage rate less than 0.1%.

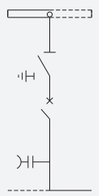
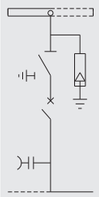
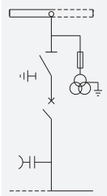
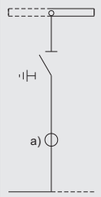
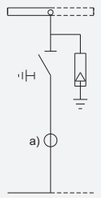
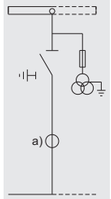
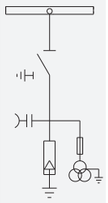
Panel structure



1. Protection and control unit
2. Low voltage compartment
3. 3-position switch mechanism
4. Gas density sensor
5. Low voltage compartment door
6. Front cover
7. Vacuum circuit breaker mechanism
8. Earthing busbar
9. Framework
10. Pressure relief of busbar gas tank
11. Main busbar and bushing
12. Busbar gas tank
13. Rear cover
14. Voltage transformer (Optional)
15. Circuit breaker gas tank
16. Pressure relief of circuit breaker gas tank
17. Inner-cone plug-in cable terminal
18. Cable
19. Plug-in surge arrester (Optional)
20. Current transformer (Optional)

Typical primary schemes

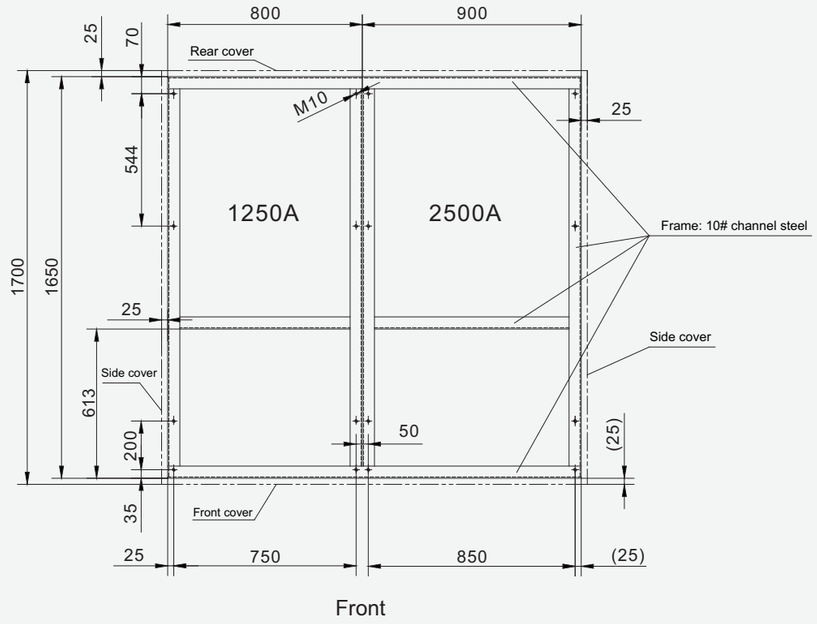
No .		1		2		3		4		5		6		7	
Primary circuit scheme															
VCB VEQ-40.5		1		1		1		1		1		1		1	
3-position switch IST(N)-40.5		1		1		1		1		1		1		1	
CT	a) Post type	Optional	3	Optional	3	Optional	3	Optional	3	Optional	3	Optional	3	Optional	3
	b) Ring type	Optional	3	Optional	3	Optional	3	Optional	3	Optional	3	Optional	3	Optional	3
PT Inner-cone plug-in type						3		3				3		3	
HV fuse (within PT)						3		3				3		3	
Voltage indicator		Available		Available		Available		Available		Available		Available		Available	
Surge arrester				3				3		3				3	
Remarks		Incoming/outgoing panel													

No .		8	9	10	11	12	13	14
Primary circuit scheme								
VCB VEQ-40.5		1	1	1				
3-position switch IST(N)-40.5		1	1	1	1	1	1	1
CT	a) Post type				3	3	3	
	b) Ring type							
PT Inner-cone plug-in type				3			3	3
HV fuse (within PT)				3			3	3
Voltage indicator		Optional	Optional	Optional				Available
Surge arrester			3			3		3
Remarks		Sectionalizer panel			Busbar riser panel			PT and Surge arrester panel

Installation foundation plans

Foundation frame

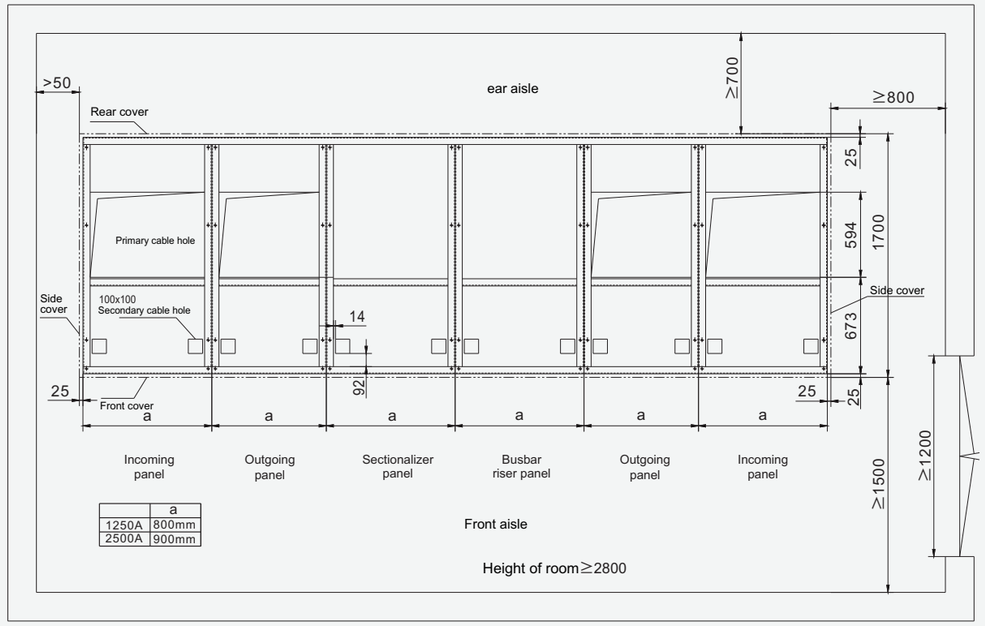
- It is recommended that switchgear shall be mounted on foundation frame or channel steel which shall be laid by qualified personnel.
- Detailed size for foundation frame of switchgear or installation hole of channel steel, please refer to the below pictures.
- Relevant standards are recommended to be complied when laying the foundation frame, in particular the flatness and straightness tolerances as a pre-condition for a perfect switchgear assembly.
- Tolerance conditions for laying the frame are:
  - Flatness tolerance: ±1mm/m^2
  - Straightness tolerance: Max.1 mm per meter, but max. 2mm for the entire length of the panel arrays .



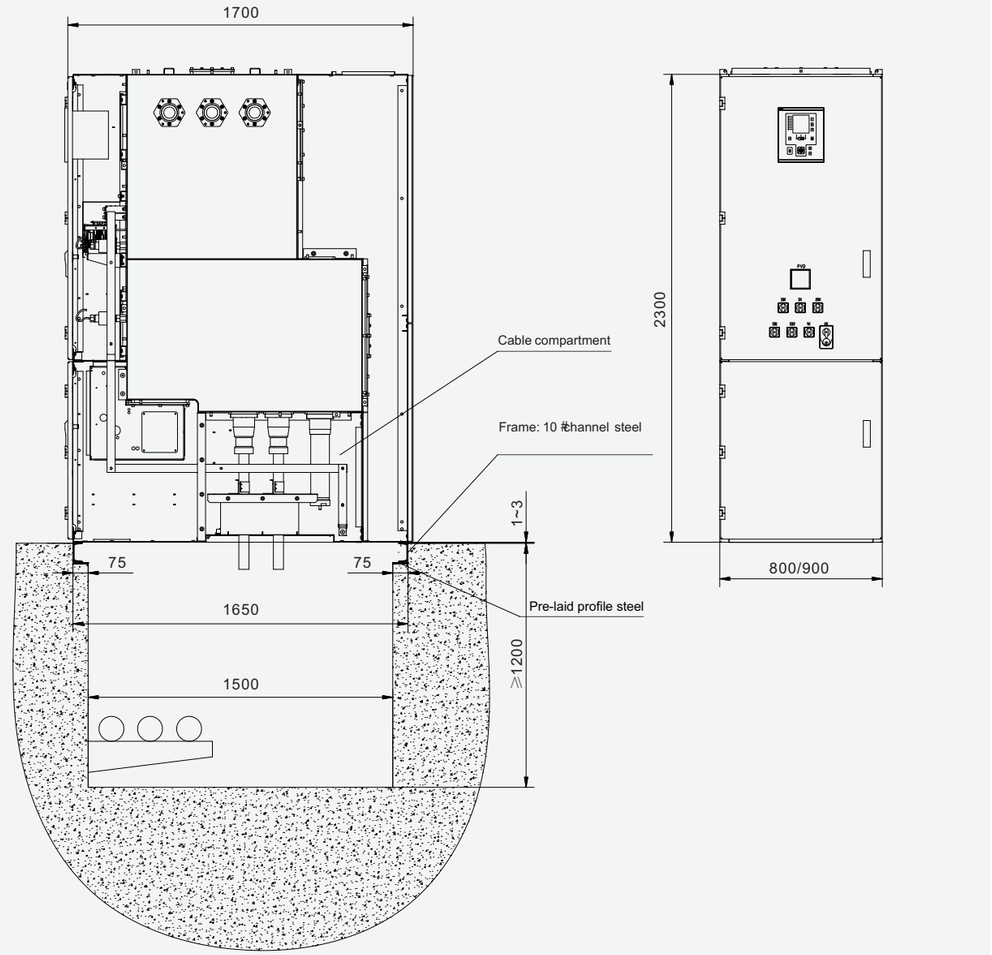
Front

Layout plan

(If required, face to face array is available.)



Cable Trench



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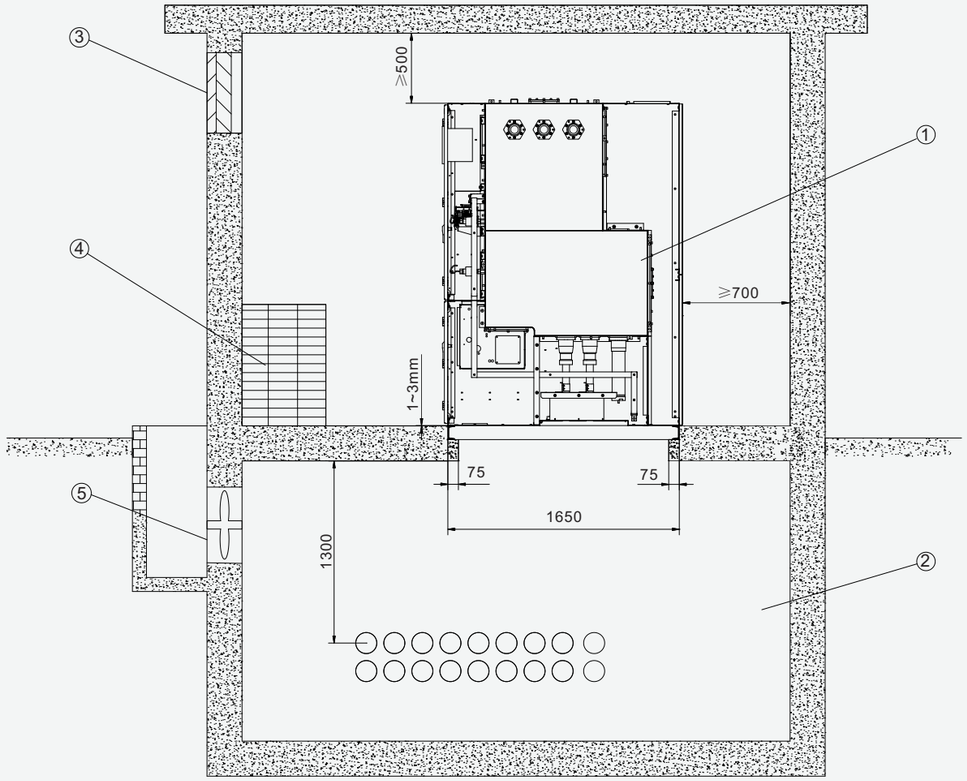
Cable Layer



1GPN2N switchgear 2. Cable layer 3. Upper ventilation 4. Lower ventilation 5. Cable layer ventilation

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