ECC®

GGD
交流低压配电柜
AC Low Voltage Distributing Switchgear

中国·上海中科电气集团
SHANGHAI CHINA-SCIENCE ELE.GROUP, CHINA

上海人民电力设备股份有限公司
SHANGHAI RENMIN ELECTRIC POWER EQUIPMERIL CO., LTD.

用途

GGD型交流低压配电柜适用于发电厂、变电站、厂矿企业等电力用户的交流50Hz，额定工作电压380V，额定工作电流至3150A的配电系统，作为动力、照明及配电设备的电能转换、分配与控制之用。

GGD型交流低压配电柜是根据能源部主管上级与广大电力用户及设计部门的要求，本着安全、经济、合理、可靠的原则设计的新型低压配电柜。产品具有分断能力高、动热稳定性好、电气方案灵活、组合方便、系列性、实用性强、结构新颖、防护等级高等特点。可作为低压成套开关设备的更新换代产品使用。

GGD型交流低压配电柜符合IEC439《低压成套开关设备和控制设备》，GB7251《低压成套开关设备》等标准。

Application

The GGD Low Voltage AD Switchgear is suitably used for electric power consumers in lines of power plants, substations, industrial and mining enterprises etc. in distributing systems with rated working voltage 380V, rated working current up to 3150A for electric conversion, distribution and control of power, lighting and distributing apparatus.

As a new generation of low voltage AC dostributing switchgear developed recently, it has been designed on requirements from national electric power ministerial superior authorities concerned, wide electric power customers and design institutions on principle of safety, economical result, reasonability and reliability, featuring high breaking capacity, excellent performance both in short time withstand current and peak value withstand current, flexible electrical schemes, easy combinations, perfect series and applicability, novel structure and high class of protection.

The switchgears is manufactured to various relevant standards such as IEC439 “Low Voltage Switchgear and Controlgear” and GB7251 “Low Voltage Switchgear”.

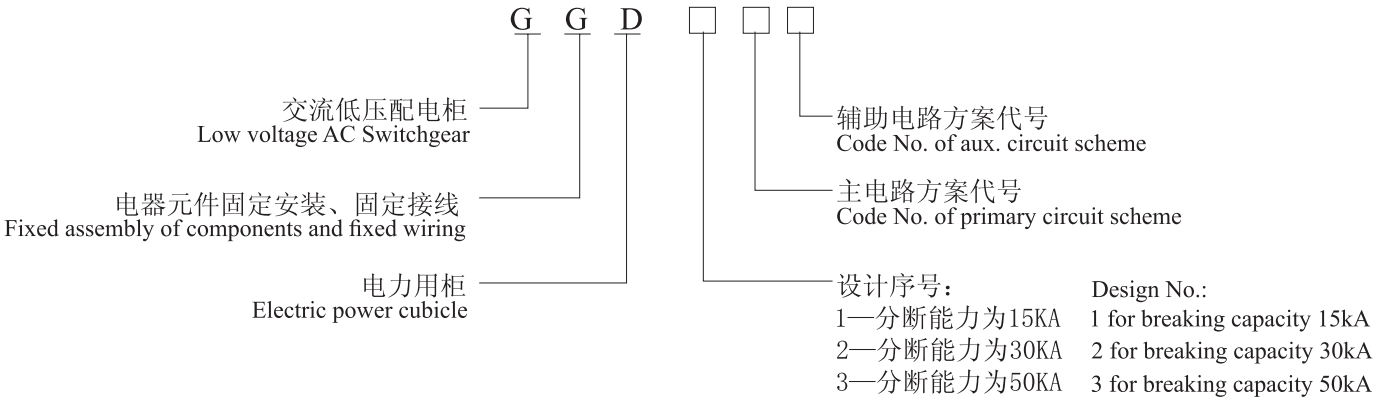
使用条件

* 周围空气温度不高于+40℃，不低于-5℃。24h内的平均温度不得高于+35℃。
* 户内安装使用，使用地点的海拔高度不得超过2000m。
* 周围空气相对湿度在最高温度为+40℃时不超过50%，在较低温度时允许有较大的相对湿度（例如+20℃时为90%）应考虑到由于温度的变化可能会偶然产生凝露的影响。
* 设备安装时与垂直面的倾斜度不超过5°。
* 设备应安装在无剧烈震动和冲击的地方，以及不足使电器元件受到腐蚀的场所。
* 用户有特殊要求时可与制造厂协商解决。

Working conditions

* Ambient temperature not higher than +40℃ nor lower than -5℃ with 24-hour average not more than +35℃.
* The altitude of application site not over 2000 meters above sea level in indoor use.
* The relative humidity of ambient air not exceeding 50% at the maximum temperature of +40℃, and higher humidity permissible at lower temperatures, e.g., 90% at +20℃. Allowance should be made for the impact of accident condensation caused by abrupt temperature fluctuation.
* The inclination to vertical surface when installation not over 5%.
* Places where there is no violent shock and impact nor sufficient corrosive materials to corrode electrical components and parts.
* Particular requirements may be solved through discussion with the manufacturer.

产品型号及含义 Type designation



电气性能
Main Technical Parameters

◆基本电器参数
Basic electrical parameters

型号 Type	额定电压（V） Rated Voltage	额定电流（A） Rated Current		额定短路开断电流（KA） Rated short circuit Breaking current	额定短时耐受电流（IS）（KA） Rated short time withstand current	额定峰值耐受电流（KA） Rated Peak value withstand current
GGD1	380	A	1000	15	15	30
		B	600(360)			
		C	400			
GGD2	380	A	1500(1600)	30	30	63
		B	1000			
		C				
GGD3	380	A	3150	50	50	105
		B	2500			
		C	2000			

◆ 主电路方案

GGD柜的主电路设计了129个方案，共298个规格（不包括辅助电路的功能变化及控制电压的变化而派生的　方案和规格）

其中：GGD1型　49个方案　123个规格
GGD2型　53个方案　107个规格
GGD3型　27个方案　68个规格

主电路方案是征求了广大设计、使用部门的意见选编的，增加了发电厂需要的方案。额定电流增加到3150A，适合2000KVA及以下的配电变压器选用。

此外，为适应无功补偿的需要设计了GGJ1、GGJ2电容补偿柜，其主电路方案4个，共12个规格。

◆ 辅助电路方案

辅助电路的设计分供用电方案和发电厂方案两部分，GGD柜内有足够的空间安装二次元件，同时NLS还开发研制了专用的LMZ3D型电流互感器以满足发电厂和特殊用户附设继电保护时的需要。

◆ 主母线

考虑到价格比和以铝代铜的可行性，额定电流在1500A及以下时采用单铝排母线，额定电流大于1500A时采用双铜排母线，生产厂按此规定制造样机并通过型式试验，当然，生产厂也可根据用户的要求将铝母线换成同等载流量的铜母线。

母线的搭接面均采用搪锡工艺处理。

◆ 电器元件选择

＊ GGD柜主要采用国内已能批量生产的较先进的电器元件，如ME、DZ20、DW15等，同时也根据经济、合理的原则，在充分考虑可行性的前提下保留了部分的可用的老产品如DZ10等。不选用已淘汰的产品。

◆ Primary circuit scheme

There are 129 schemes with 298 specifications for primary circuit excluding derivative schemes and specifications due to variations in control and protection of auxiliary circuits, of which there are:

49 schemes with 123 specs for GGD1
53 schemes with 107 specs for GGD2
27 schemes with 68 specs for GGD3.

The primary schemes are prepared as per comments and suggestions from wide designers, manufacturers and application organizations for the additional needs for power generation. The rated current is enhanced up to 3150A, which is suitable for selection with 2000kVA and below transformers.

Besides, condenser compensation cubicles GGJ1 and GGJ2 are designed to cater for needs of boosting power factor with 4 primary circuit schemes and 12 specifications in all.

◆ Auxiliary circuit scheme

GGD auxiliary circuit is designed in two parts, i.e., power supply and consumption scheme and power plant service scheme. It is spacious enough to mount secondary components in GGD Cubicle. Meanwhile, NLS has developed a special LMZ3D current transformer for the needs of power plants and particular customers in relaying protection attached.

◆ Main busbars

Considering the performance-price ratio and feasibility of taking aluminum instead of copper, we adopt single row aluminum busbar for those working under rated current 1500A and below, however, in circuits with rated current more than 1500A, we apply double row copper busbar. The manufacturer manufactures sample product in this way and passes type test. Of course, the manufacturer may replace aluminum busbar with copper one with same carrying capacity.

The connection surface of busbars is dealt with tin hot-dipping treatment without any exception.

◆ Choice of electrical components

＊ Batch produced domestically advanced electric apparatus are mainly used in ECC's GGD Switchgear such as ME, DZ20 and DW15 Circuit Breakers to name just a few. Also we can use part of traditional products such as DZ10 on full consideration of feasibility, economical and reasonable principles. Obsolete products are not supposed to be selected.

* HD_{13BX}和HS_{13BX}型旋转操作式刀开关是NLS为满足GGD柜独特结构的需要而设计的专用的元件，它改变了机构的操作方式，保留了老产品的优点，是一种实用新型的电器元件。
* 如设计部门根据用户需要，选用性能更优良、技术更先进的新型电器元件时，因GGD柜具有良好的安装灵活性，一般不会因更新电器元件造成制造和安装方面的困难。
* 为进一步提高主电路和的动稳定能力，NLS设计了GGD柜专用的ZMJ型组合式母线夹和绝缘支撑件。母线夹由高强度、高阻燃型PPO合金材料热塑成型，绝缘强度高、自熄性能好、结构独特，只需调整积木式间块即可方便地组合成单母线夹或双母线夹，绝缘支撑是套筒式模压结构，成本低、强度高，解决了老产品爬电距离不够的缺陷。

结构特点

◆ GGD型交流低压配电柜的柜体采用通用柜的形式，构架用8MF冷弯型钢筋局部焊接组装而成，构架零件及专用配套零件由型钢定点生产厂配套供货，以保证柜体的精度和质量。

通用柜的零部件按模块原理设计，并有20模的安装孔。通用系数高，可以使工厂实现予生产，既缩短了生产制造周期，也提高了工作效率。

◆ GGD柜设计时充分考虑到柜体运行中的散热问题。在柜体上下两端均有不同数量的散热槽孔，当柜内电器元件发热后，热量上升，通过上端槽孔排出，而冷风不断地由下端槽孔补充进柜，使密封的柜体自下而上形成一个自然通风道，达到散热的目的。

◆ GGD柜按照现代工业产品造型设计的要求，采用黄金分割比的方法设计柜体外形和各部分的分割尺寸，使整柜美观大方，面目一新。

◆ 柜门用转轴式活动铰链与构架相连，安装、拆卸方便，门的折边处均嵌有一根山型橡塑条，关门时门与构架之间的嵌条有一定压缩行程，能防止门与柜体直接碰撞，也提高了门的防护等级。

◆ 装有电器元件的仪表门用多股软铜线与构架相连。柜内的安装件与构架间用滚花螺钉连接，整柜构成完整的接地保护电路。

◆ 柜体面漆选用聚酯桔形烘漆，附着力强，质感好，整柜呈亚光色调，避免了炫目效应，给值班人员创造了较舒适的视觉环境。

* HD_{13BX} and HS_{13BX} Rotating Operation Knife Switches are specially designed for the unique structure of GGD Cubicles. These products are new types of applicable and novel electric apparatus that change the operating mode of the mechanism and remain merit points of the tradition products.
* Because of wide applicability, better performance and assembly flexibility of the GGD Cubicle, more advanced apparatus can be used as per requirement of customers without any difficulty in assembly and manufacturing.
* ZMJ Combined Busbar Clamps and Insulating Supports are specially designed used in GGD Series product for purpose of boosting peak value withstand capacity of main circuit further more, featuring high mechanical intensity, thermal plastic shaping from flame retardant PPO alloy materials, high insulating strength, self-extinguishing and unique structure. Single busbar clamp and double busbar clamp are easily combined through regulating relevant building blocks to a certain degree. Insulating supports are of bushing type module pressure structure resulting in low cost, high intensity, giving solution to insufficient creepage distance of traditional products.

Features in structure

◆ The cubicle body is of common cubicle mode and the cubicle frame is made of 8MF cold bent shaped steel with partially welded and setup. The frame components and special parts are supplied by our fixed supplier of shaped steel in order to guarantee accuracy and quality of the frame body.
The components and parts of the common cubicle are designed in modular principle with fixation holes of modulus 20, possessing high all-purpose coefficient, which brings the prefabrication into realization for the manufacturer resulting in both reduction of manufacturing cycle and an increase in work efficiency.

◆ Fully considering thermal dispersion during operation, the GGD Cubicle is designed to have thermal dispersion holes distributed different in number on both top and bottom ends of the cubicles. When heat is generated from electrical apparatus in cubicle, the heated air rises and goes out of the cubicle into atmosphere from holes located on top part of it whereas cold air replenishes from bottom holes. Thus a natural vent channel forms to disperse heat generated in cubicle in this way.

◆ According to the requirement of modern industrial product appearance, the dimension of the Cubicle is designed as per golden section ratio as to achieve eye-appealing results.

◆ Cubicle doors and cubicle frames are linked with rotating shafted flexible hinges with easy mounting and dismantling. There is an E-shaped rubber plastic bend embedded on bent edge of the door so that a certain compressing travel is formed between the door and the frame when closing, which prevents of the door and frame from direct hit and enhances class of protection for the cubicle.

◆ The instrument panel with electrical apparatus and components are connected to those in cubicle with flexible strand copper wires. The installing parts are linked with frames and supporters via lathed screws. A complete earthing circuit system is a must for the switchgear.

◆ The Cubicle is coated with a kind of polyester baked orange paint with a performance of strong adhesive and good appearance. The color is of sub-light in nature without any dazzling effect so as to give out a comfortably visual environment.

◆ 柜体的顶盖在需要时可拆除，便于现场主母线的装配和调整，柜顶的四角装有吊环，用于起吊和装运。
◆ 柜体的防护等级为IP30,用户也可根据使用环境的要求在IP20~IP40之间选择。

安装与使用

产品到达收货地点后，首先应当检查包装是否完整无损，发现问题应及时通知有关部门查找原因，对于不立即安装的产品，应根据正常使用条件的规定，置于适当的场所。

◆ 产品包装

产品的安装应按安装示意图进行（见附图2），基础槽钢和螺栓用户自备，主母线安装时应将搭接面修理平整，处理干净，涂上中性凡士林或采取其他措施，然后用螺栓坚固。

◆ 产品在安装完毕后投入运行前需进行如下项目的检查与试验。

* 检查柜体面漆有无脱落，柜体是否干燥，清洁。
* 电器元件的操作机构是否灵活，不应有卡滞或操作力过大现象。
* 主要电器的通断是否可靠、准确、辅助接点的通断是否可靠准确。
* 仪表指示与互感器的变比及极性是否正确。
* 母线连接是否良好，绝缘支撑件，安装件及附件是否安装牢固可靠。
* 辅助接点是否符合要求，熔断器的熔芯规格是否正确，继电器的整定值是否符合设计要求，动作是否准确。
* 电路的接点是否符合电器原理图要求。
* 保护电路系统是否符合要求。
* 用500伏兆欧表测量绝缘电阻值不得低于1兆欧。

◆ 使用注意事项

* 本产品为不靠墙安装，单面（正面）操作，双面开门维修低压配电柜。产品的维修通道及柜门，必须经考核合格的专业人员方可进入或开启进行操作，检查和维修。
* 空气断路器，经过多次合、分后，会使主触头局部烧伤和产生碳类物质，使接触电阻增大，应定期对空气断路器按其使用说明书进行维护和检修。

◆ The top plate of the Cubicle may be removed away when necessary for site installation and regulation of main busbars. There are hooks at four corners of the Cubicle top for lift and shipping.
◆ The class of protection is IP30 for cubicle body, however, customers may select between IP20 ～ IP40 according to actual ambient environment.

Incoming and outgoing schemes

On arrival of the product, check the package to make sure there is no damage on it and everything keeps intact and complete. If there is some problems found, inform the department concerned immediately and trace their reasons. For products not to be installed right away, put them in proper location as per regulations of working conditions.

◆ Installation

Installation should be made as per schematic drawing (refer to attachment Fig. 2). Foundation channel steel and screws should be prepared by customers themselves. When connection is made to busbars, the connection surfaces of them should be clean, smooth and even, coated with a neutral Vaseline or other measures taken, and linked together with bolts firmly.

◆ The following inspections and tests should be made after completion of installation and before put into operation:

* Is there any paint peeled off? Is it clean and dry inside cubicles?
* Are the operating mechanisms of electrical components operated flexibly? No awkward operations with over operating forces.
* Is the ON and OFF operation for main apparatus reliable and correct? Is ON and OFF operation for auxiliary contacts reliable and correct?
* Are instrumental indications of transformation ratio and polarity in relevant instrumental transformers correct?
* Are the connections of busbars in good condition? Are the supports, fixation parts and their accessories mounted firmly and reliably?
* Are the auxiliary contacts in conformity with relevant requirements? Is the specification of fuse element correct? Are setting values of relays entirely to the design requirements and operations correct?
* Do the electric contacts in electric diagram comply with its schematic drawing?
* Is the protective circuit system in conformity with requirement?
* The insulation resistance measured with a 500V megger is by no means lower than one megohm.

◆ Cautions paid to operation

* This is a kind of low voltage distributing switchgear of single-panel (front panel) operation and double-panel maintenance, and installed in a way not directly against wall. Only qualifiedly examined professional operators can open cubicle doors and access into maintenance aisle for operation, inspection and maintenance.
* Partial burnt down and carbon substances will happen to and generated on main contacts of an ACB due to several times of close and open operations and consequently the contact resistance will increase. Therefore, regular inspection, maintenance and reparation as per operation manual for ACB are necessary.

外形尺寸安装示意图 Overall dimensions and installation schematic drawings

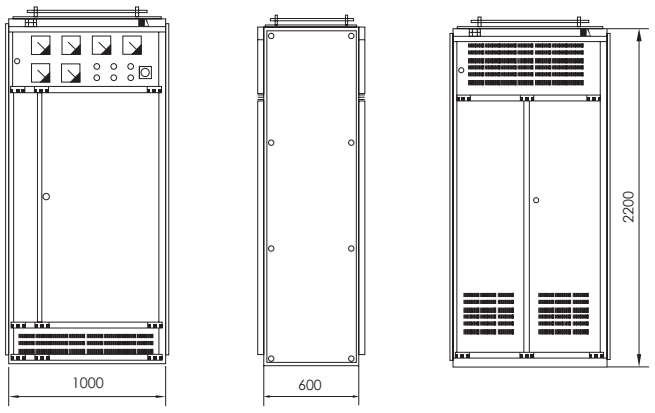


图1. 外形示意图

Fig.1 Overall schematic drawing

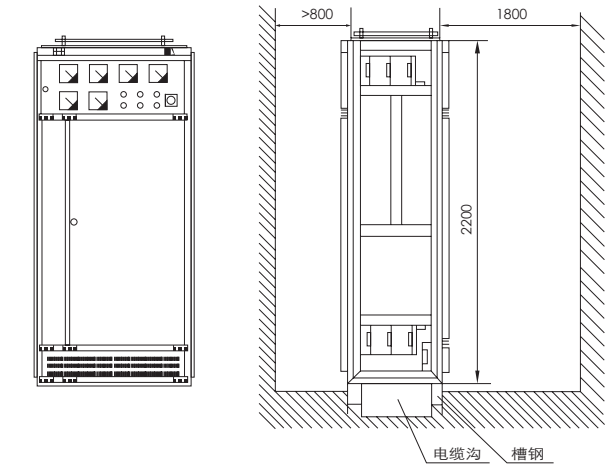
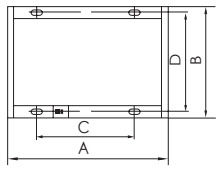


图2. 安装示意图

Fig.2 Installation schematic drawing



产品代号 Product code	A	B	C	D
TGGD 06	600	600	450	556
TGGD 06A	600	800	450	756
TGGD 08	800	600	650	556
TGGD 08A	800	800	650	756
TGGD 10	1000	600	850	556
TGGD 10A	1000	800	850	756
TGGD 12	1200	800	1050	756

产品成套性

制造厂供货时应提供下列文件及附件：

* 装箱清单
* 产品合格证
* 使用说明书
* 出厂试验报告
* 有关电气图纸
* 柜门钥匙，操作手柄及合同单规格的备品备件。

订货须知

用户订货时应提供如下资料：

* 产品的全型号（包括主电路方案号和辅助电路方案号）
* 主电路系统组合顺序图
* 辅助电路电器原理图
* 柜内元器件清单
* 其他与产品正常使用条件不符的特殊要求。

Product completeness

The product should goes with the following documents and attachments:

* Packing List
* Product Certificate
* Operation Manual
* Routine Test Report
* Electric diagrams concerned
* Keys to cubicle doors, operating handles, spare parts specified in ordering sheet

Information given when ordering

* Full type of the product including the main circuit schemes and auxiliary circuit schemes.
* Combination procedure drawing of main circuit system.
* Electrical schematic drawing of auxiliary circuits.
* Detail list of components and parts in cubicle.
* Particular requirements other than those in normal working conditions of the product.