



Exploration & Production

GENERAL SPECIFICATION

ELECTRICAL

GS ELE 137

Distribution boards

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1. Scope

This specification cover the minimum requirements for the design, manufacture, testing and supply of fixed low voltage stationary distribution boards (UPS distribution boards, lighting and small power, heat tracing....) installed in safe area. It does not include motive power distribution for process equipment.

2. Reference documents

The reference documents listed below form an integral part of this General Specification. Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the EFFECTIVE DATE of the CONTRACT.

Design and engineering shall conform as a minimum requirement to the current edition of the following in order of preference:

- Applicable laws and regulations of the country in which the system will be operated. In cases where no "local" regulations exist, then French laws and regulations shall be used.
- COMPANY Particular Specifications and data sheet (if any)
- COMPANY General Specifications
- Applicable International Electrotechnical Commission (IEC) publications
- Applicable CENELEC Standards
- Applicable recognised standards and codes (e.g. UTE-NFC, BSI, VDE, etc.) where IEC publications have not yet been issued.

Distribution boards shall be designed, manufactured and tested in accordance with the latest applicable sections (with amendments) of the relevant IEC standards.

Standards

Reference	Title
IEC 60044	Instrument transformer
IEC 60050	International Electrotechnical Vocabulary
IEC 60068	Environmental testing
IEC 60255	Electrical relays
IEC 60269	Low voltage fuses
IEC 60439	Low voltage switchgear and controlgear assemblies
IEC 60529	Degrees of protection provided by enclosures (IP code)
IEC 60664	Insulation co-ordination within low voltage systems
IEC 60706	Guide on maintainability of equipment.
IEC 60947	Low voltage switchgear and controlgear
IEC 61000	Electro Magnetic Compatibility (EMC)
IEC 61293	Marking of electrical equipment with ratings related to electrical supply - Safety requirements

Reference	Title
IEC 62262	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)

Professional Documents

Reference	Title
Not applicable	

Regulations

Reference	Title
Not applicable	

Codes

Reference	Title
Not applicable	

Other documents

Reference	Title
Not applicable	

Total General Specifications

Reference	Title
Not applicable	

3. Service conditions

The distribution board shall be suitable in all aspects for continuous operation at full load service.

The distribution board shall be designed for use under normal service and environmental conditions as specified in the particular project specification.

The equipment shall be suitable for operation, without deleterious effect, with variations of voltage and frequencies as follows:

- Voltage supply: $\pm 10 \%$
- Frequency: $\pm 5 \%$

4. Neutral earthing system

The earthing system shall be indicated in the particular project specification. In case of IT system, the permanent earth fault monitoring device shall be installed inside the distribution board assembly.

5. Construction requirements

5.1 Degree of protection

The minimum degrees of protection shall be at least:

- IP21 when installed indoors.
- IP55 when installed outdoors, in protected areas and under shelters and IP65 in unprotected and exposed areas (the local control panel of some packaged units shall be mounted on the skid), however this shall be subject to COMPANY approval.
- IK 08 for any type of enclosure.

5.2 Enclosure

Distribution board shall be entirely prefabricated and tested in Manufacturer's factory.

Distribution board enclosure shall be made of metal sheeting or polyester.

Distribution board shall be cubicle type for floor standing installation or box type for wall mounting installation and flush fronted construction.

Metal sheeting enclosure shall be hot dip galvanised steel for outdoor installation.

Polyester enclosure shall be self-extinguishable.

Distribution board above 25kg shall be fitted with eyebolt/lifting eyes.

Distribution board assembly shall be self-ventilated. Where louvers are necessary, the louvers shall be within the IP and IK ratings.

Unless otherwise specified, distribution board shall be designed for front access only with door.

Unless otherwise specified, distribution board shall be bottom entry.

Outdoor and/or wall mounted distribution boards shall be fitted with a gland plate. The gland plate shall be sized such as to accommodate cable glands for all incoming and outgoing circuits including plugs for spare circuits.

Distribution board shall be equipped with door stay system and handles. No key or locking device board is required for distribution board installed in technical room.

When a key system is used, it shall be a double pin 5mm system.

5.3 Arrangement

The distribution board shall be so arranged to form a single structure with a common busbar.

When tropicalisation is required in the Project particular specification, the MANUFACTURER shall indicate in his proposal the additional treatment performed.

The distribution board assembly and their components shall be of standard type and, similar parts and components shall normally be interchangeable. The number of item type shall be limited.

Switching devices (circuit breakers, contactors, switches...) shall be installed on horizontal rails. These shall be clip-on type for miniature circuits breakers (MCB) or bolted onto steel plates for moulded case circuit breakers (MCCB).

The apparatus and circuits in the distribution board assembly shall be so arranged to facilitate operation and maintenance, and to ensure the necessary degree of safety according to [IEC 60439-1](#) § 7.4.6. All components shall be easily accessible.

5.4 Busbar

Where busbar is required, they shall be installed in compartment separated from the functional units (form 2b minimum as per [IEC 60439](#) §7.7).

Busbar shall be of the same cross-sectional area through out the switchboard and made of hard drawn bare copper.

Busbar shall be rated for the nominal current and not lower than the incoming unit.

Busses suitable for "clip-on" circuit breaker mounting may be used up to 32A.

Accidental contact of people or tools with live parts shall be made impossible.

When the atmosphere is highly corrosive, busbar shall be protected with heat shrinkable sleeves, tinned copper or similar.

Busbar and connections shall be adequately sized, braced and supported to withstand the mechanical constraints and thermal effects resulting from the switchboard rated short circuit current.

5.5 Incoming circuit

Unless otherwise specified, a padlockable switching device shall be used. Mechanical interlock between the switching device and the door is not required.

5.6 Outgoing circuits

5.6.1 Fuse-contactor

Fuses shall only be used associated with contactor and equipped with striker pins.

5.6.2 Circuit breaker

Unless otherwise specified all circuit breakers shall be equipped with an auxiliary contact for fault signalling. All circuit breakers fault signals shall be grouped to provide a common signal wired on terminal for remote signalling purpose.

All circuit-breakers shall be fitted with padlocking device.

Unless otherwise specified, circuit-breakers for distribution feeders will be operated manually. If a tripping coil is required, it shall be of energised to trip type unless otherwise stated.

Unless otherwise specified socket outlets circuits shall be fitted with a 30-mA earth leakage device.

All circuit breakers shall be multipole switching (including neutral).

At least 20% of the total number of outgoing circuits shall be provided as spare. Spare circuits shall be equipped with circuit-breakers of suitable ratings that match those installed, and wired on terminal blocks.

5.7 Earthing

Constructional precautions shall be taken to ensure electrical continuity between the exposed conductive parts of the distribution board and between these parts and the protective circuits of the installation.

An earth busbar shall be provided along the full length of the distribution board assembly with terminals for external protective conductors marked according to [IEC 60445](#). Earthing busbar shall be made of hard drawn copper (minimum equivalent cross section 35 mm²).

All metallic non-current carrying parts of the distribution board assembly including hinged doors shall be connected to the protective earth busbar. When a part of the distribution board is removed from the enclosure, for example for routine maintenance, the protective circuits for the remainder of the assembly shall not be interrupted.

Connecting facilities shall be provided in the vicinity of the conductor terminals, for connection of associated cable armour and screen to the earth bus bar.

Green/yellow strips shall identify protective circuit.

5.8 Internal wiring

Flexible conductors shall be used.

Internal wiring shall be stranded copper, self-extinguishable, insulated with black or white PVC 450/750 V grade with the following minimum cross-sections:

- 2.5 sq. mm for current circuits
- 1 sq. mm for voltage circuits
- 0.75 sq. mm for auxiliary wiring (control, signals, etc)

For electronic circuit wiring, the Manufacturer's standard shall be used.

When required by Project, wiring shall be halogen free.

All wiring shall be marked at both end and identification shall refer to the related wiring diagram.

All wiring for external connections shall be brought out to individual terminals on a readily accessible terminal block. Wires shall be terminated using compression type lugs or crimp sleeve. No more than two wires shall be connected on the same terminal.

No cable trunking shall be filled to more than 70% capacity.

5.9 Instrument transformers

Current transformers shall be of dry insulation type (complete coating of thermosetting synthetic resin).

Current transformer accuracy shall be:

- Class 1 for current measuring
- Class 5P for protective relays when required by the MANUFACTURER
- Class 10P for other cases (over current relay).

The secondary current rating for measuring CT shall be either 1A or 5A. However, where remote metering is required, the current rating shall be 1A.

The MANUFACTURER shall provide details on ratio, output, class and accuracy for all instrument transformers in his supply.

The secondary windings of instrument transformers shall be earthed at one point. Bridging terminals for current transformers shall be provided at the outgoing terminals where external connections are required.

Current transformers shall be rated to withstand the thermal and magnetic stresses resulting from the bus bar rated fault level.

5.10 Metering, protection, control and indication

Metering, protection, control and indication shall be in accordance with the single line diagrams, typical protection diagrams and particular project specification if any.

All meters shall be mounted at a suitable height to allow a correct reading. All scales shall be properly selected for the expected operating condition.

Meters and relays shall be capable of withstanding without damage, the rated fault current flowing in the primary of current transformers.

All indicating lamps shall be multi-LED type.

As a minimum, the following colour code shall be used

Status:

On / closed / Running:	RED
Off / Open / Stopped:	GREEN
Fault / Trip	YELLOW
Voltage presence	WHITE

Push button:

On / Close / Start:	GREEN
Off / Open / Stop:	RED

Intertrip circuits shall use hardwired auxiliary contacts and, unless otherwise specified, without interposing relays.

Selection and co-ordination of short circuit protective devices shall be such as to ensure maximum service continuity.

Polarity distribution shall be carried out via circuit breakers.

5.11 Remote signalisation

The required indications and alarm signals shall be as detailed in typical diagrams or in the particular specification.

Status signals shall be originated from volt free contacts.

5.12 Cable terminations

Internal width dimension of cubicle's shall be designed in accordance with quantity, type and dimension of incoming/outgoing cables to be connected to make sure that connection can be performed easily and safely.

Connection for external cables shall be via terminal blocks located on rails at the bottom of the panel. Cable terminating facilities shall be suitable for the specified cable type and conductor size.

No more than one wire shall be connected on the same terminal.

Cables with voltage higher than 48 V shall be connected on segregated terminals, which are to be fitted with insulating screens and red warning labels

Terminals shall be identified in accordance with the wiring diagram. The lay out shall be logical and consistent.

Cable supports shall be provided to avoid undue strain on cable terminations.

Power and control cables shall be routed and terminated in separate cable trunking.

20% spare terminals shall be provided.

6. Miscellaneous

6.1.1 Markings

Distribution board shall be provided with nameplate, marked in a durable manner and located in a visible place. Manufacturer's name or trade mark and identification number shall be given as a minimum.

Inside the distribution board, individual circuits, protective devices and all other components shall be identify by labels. The designation used for each item shall be identical with those in the wiring diagram.

Language used for labelling shall be stated in the project particular specification.

Nameplates for cubicles, compartments units shall be laminated engraved plastic with black letters on a white background and shall be fixed by rivets or screws or on a dedicated support. Stuck labels are prohibited

Nameplate for circuit breakers shall be strictly in accordance with the project particular specification.

Components labelling shall be the Manufacturer's standard.

Operating procedure when needed and warning notices shall be installed at the nearest operating/danger point.

Warning labels shall be provided.

6.1.2 Special tools and accessories

Supply shall at minimum include all the necessary materials for fixing the cubicles to the floor (anchor bolts, etc.).



6.1.3 Painting

The manufacturer's standard shall be used unless otherwise specified. The entire coating shall be sufficiently resistant to withstand transport, assembly and maintenance operations without damage.

The metallic parts shall be painted and suitably protected against corrosion using an appropriate treatment.

6.1.4 Free space

Unless otherwise specified, it shall be planned for the future extension a provision of 20 % free space.

6.1.5 Anti condensation space heater

Unless otherwise specified, anti-condensation heaters shall be provided. It shall be supplied from a dedicated source and individually protected by an earth leakage circuit breaker. Its control shall be done automatically by means of a hygrostat.

7. Inspection and testing

7.1 General

All equipment covered by this specification shall be subject to inspection and testing by COMPANY at MANUFACTURER works during manufacture. In certain cases these activities may extend to MANUFACTURER'S subcontractors

Inspection and tests shall be performed in accordance with IEC standards.

7.2 Type tests

Type tests in accordance with the referenced standards shall have been carried out on MANUFACTURER'S similar equipment and the type test certificates shall be provided with the quotation. When appropriate type test certificates do not exist, tests shall be made at the time of manufacture of the equipment to which this specification refers, subject to COMPANY approval.

7.3 Factory acceptance tests

Unless otherwise specified Factory acceptance tests shall be performed by MANUFACTURER in the presence of COMPANY representative. The routine tests in accordance with the [IEC 60439](#) shall be performed.

At least the following tests shall be performed:

- Visual check of the distribution board including inspection of wiring (aspect, painting, finish, welding, sheet metal, lifting ring, locks, screwed and bolted connection, proper conductors laying, proper devices mounting, conformity to the wiring diagrams, labels)
- Distribution board electrical operation test (remote control and signalling, inter-tripping, automatic sequences if any, etc)
- Dielectric test
- Dimension controls (terminals, busbar and wires, clearances and creepage distances, fixation axis, overall dimensions)



- Quality and quantity check for wearable parts and spare parts according to the specification.
- Checking of protective measures and of the electrical continuity of the protective circuits.

A test report of the acceptance tests shall be issued.

8. Documentation

Unless otherwise specified in project particular specification, MANUFACTURER shall at least provide the following documents:

- Overall arrangement drawing
- Civil works drawings
- Transportation procedure
- Tropicalisation specification if any
- One line diagram
- Wiring diagram
- Schematic diagram
- Digital relay setting data sheet, if any
- Installation, operation and maintenance instructions
- Spare parts list
- Detailed equipment information (technical documentation).
- Type test reports
- FAT reports