

**General Specification for Construction, delivery
and assembly of Gas Insulated Switchgear [XX]
kV – Single Busbar with Vacuum Circuit Breaker**

.....
This is the common article to use for mainly prescription and
tendering purposes

Content of it :

- General condition,
- Standards,
- Rated values,
- Main system parameters,
- General acceptance parameters,
- Type & routine tests,
- Quality futures

Blue marked texts are [Option]:

Please check project by project which option is needed.

Delete or choose your option in the text or delete
complete chapter if not needed.

Table of content will change automatically if you refresh
it.

Project

[XYZ] [XX] kV

Table of Contents

| | | |
|-----------|--|-----------|
| 1 | General features of Switchgear | 4 |
| 1.1. | Basic design of Switchgear | 4 |
| 1.2. | Ecological correct construction | 4 |
| 1.3. | Cladding and compartments | 5 |
| 1.4. | Gas compartment technology and control | 5 |
| 1.5. | Internal Arc fault classification | 6 |
| 1.6. | Operation and control | 6 |
| 1.7. | Interlocking system | 7 |
| 1.7.1. | Mechanical interlock | 7 |
| 1.7.2. | Electrical interlock (over several cubicles) | 8 |
| 1.8. | Checking of Voltage presence (VDS-system) | 8 |
| 1.9. | Cable connection compartment | 9 |
| 1.10. | Low voltage compartment | 9 |
| 1.11. | Corrosion protection and lacquering | 10 |
| 1.12. | Transformers | 10 |
| 1.12.1. | Ring core current transformer (CT) | 10 |
| 1.12.2. | Voltage transformer (VT) | 11 |
| 2. | instructions, rules and standards | 11 |
| 3. | Switchgear | 12 |
| 3.1. | Circuit breaker | 12 |
| 3.2. | Three-position combined disconnecter / earthing switch | 12 |
| 4. | Auxiliary Circuits | 13 |
| 4.1. | Wiring | 13 |
| 4.2. | Protection and Control System (IED) | 13 |
| 4.3. | Voltage Presence Indication System – VPIS | 14 |
| 4.4. | Voltage Detection relays | 14 |
| 5. | Content of offer | 15 |
| 6. | Technical characteristics (i.e. to be checked by Specifier on case-by-case basis) | 16 |
| 6.1. | Switchgear | 16 |
| 6.2. | Three-pole vacuum circuit breaker | 17 |
| 6.3. | Three-position combined disconnecter / earthing switch | 17 |
| 7. | Technical characteristics of the offered switchgear | 17 |
| 8. | Equipment of cubicles | 19 |
| 8.1. | Incoming feeder | 19 |
| 8.2. | Outgoing feeder | 20 |
| 8.3. | Bus section | 21 |

| | |
|---|-----------|
| 8.4. Metering cubicle..... | 22 |
| 9. Switchgear attachments | 23 |
| 10. Documentation | 24 |
| 11. Freight, packing, delivery | 24 |
| 12. On-site assembling | 25 |
| 13. Ecology and certificates | 25 |
| 14. Factory witness test..... | 25 |
| 15. Other tender conditions | 26 |
| 16. Dates..... | 26 |
| 17. Price table | 27 |

1 General features of Switchgear

1.1. Basic design of Switchgear

Supplier should offer Gas Insulated Switchgear according to all current valid standards and terms, factory-assembled, offered as single busbar Switchgear with Vacuum Circuit Breaker and combined disconnecter / earthing switch.

The switchgear is to be designed as indoor switchgear for installation in a closed electrical operating site.

The installation of the new switchgear shall be in a row on a base frame fixed e.g. on a concrete floor.

The Switchgear construction must ensure that during the entire life-time of this switchgear, no gas works on site are necessary (during installation, extension, or disassembly), nor for replacing a centre placed cubicle.

Gas-filling and gas-tightness test must be part of the factory routine test.

In the case of an internal arc, rapid return to service of the adjacent intact cubicles is to be proven.

To ensure maximum security for personnel, all handling and service actions and cable connections shall be done from the front side of the switchgear.

The applicable IEC standards shall be listed and named in the offer and relevant Declarations of Conformity should be provided for performances listed in this specification.

1.2. Ecological correct construction

The switchgear must satisfy to a high degree the ecological requirements in view of environmental protection.

The consumption of material and energy during production is to be minimized in an optimum fashion. This applies especially to the utilization of insulating material.

Ecologically safe, low-maintenance operation with a service life of min. 30 to 40 years must be possible. Use of recyclable materials for efficient and complete (90%) disposal at the end of the service life must be proved by a utilization data sheet.

The offer must be accompanied by a certificate confirming that the quality requirements acc. to ISO 9001 have been complied with.

After the course of operational switchboard life it must be possible to recover the complete SF6-gas of every gas-filled compartment by a serial recover valve. Special equipment of the switchboard supplier for recovering is permitted.

Refilling of gases shall be not necessary for the switchgear total life-time.

1.3. Cladding and compartments

The Switchgear shall be three-pole encapsulated.

The Switchboard with single busbar configuration must be designed with the following compartments as a minimum:

Busbar with combined disconnecter / earthing switch

HV compartment, not accessible gas insulated

Circuit Breaker, HV compartment, not accessible gas insulated

Cable connection, HV compartment, interlock accessible (air insulated)

Low voltage cabinet (air insulated)

Drive mechanism (air insulated)

The cladding of the cubicle must have the following features:

- well arranged mechanical assembly
- short easy to access drive mechanism.
- minimum use of bushings allowing the mechanical driving mechanism to pass the movement into the gas compartment.
- fully gas insulated between the busbar compartments and the circuit breaker compartment (no air gap allowed)

The gas insulated busbars shall be connected with single-pole solid insulated connection links outside the gas compartment. End caps shall be available with secure voltage resisting close-offs.

For site connection of the busbars, the number of electrical joints should be minimized. Solutions are preferred which require only one joint per phase for each cubicle during switchgear erection & assembly.

The cable connection area must have a removable cover for access.

1.4. Gas compartment technology and control

The gas compartments shall be filled with the insulation gas SF6 and shall be designed as sealed pressure systems, according to IEC 62271-1.

Circuit breaker and busbar compartments are separated gas-filled compartments per cubicle.

The temperature compensated gas pressure monitoring device has to be visible directly from the central position at the respective front side of the switching unit, without opening doors or covers. The system for monitoring the gas pressure must provide two limit values (pre- and basic-warning), which are available for onward report. Auxiliary contacts should be provided for remote signalling. The device should be self monitored.

The design of the switchgear must ensure that during the assembly and whole life-time of the switchgear, no gas works on-site are necessary:

- During assembly
- If extensions are added
- During replacement of a centre panel
- Or during decommissioning at the end of the Switchgear's life time.

The operational leakage rate for the gas isolation must not exceed 0.1% per year.

For the expected service life of the switchgear, under typical indoor operating conditions, re-filling insulation gas should not be essential.

To guarantee maximum operating reliability and easy decommissioning of the Switchgear, the number of gaskets, static bushings and pressure relief devices are to be kept to a minimum. All three circuit breaker poles of each switchgear shall have only one combined gas-tight bushing.

Static bushings shall be gasketed with pressure rated packing (Elastomer-gasket system) for the service life of the switchgear.

The cubicles shall be gas filled and leakage-tested in the factory.

In order to ensure simple recycling at end of life-time, a recovery valve per compartment shall be provided, which allows easy extract of the gas with standard tools.

1.5. Internal Arc fault classification

The internal arc fault classification is defined in accordance with the latest version of IEC 62271-200.

The rated short circuit current must correspond at least to the rated short circuit current of the whole switchgear. The internal arc duration is to be 1 s.

The Internal Arc classification shall be IAC [AFL] or [AFLR]

The distance from switchgear rear side to the building wall shall be [100mm +- 30mm for AFL] or [800mm for AFLR]

The distance from the left/right side of the switchgear to the building wall shall be [100mm +- 30mm for AFL] or [800mm for AFLR].

Covers from the switchgear side wall to the building walls are part of the switchgear manufacturer.

1.6. Operation and control

On-site operation under normal service conditions of the switching unit shall be done via an intelligent bay module, installed in the low voltage cabinet.

All operation and service actions must be practicable from the front of the cubicle operating side.

Mechanical Operation should also be provided for use when the auxiliary supply is unavailable.

The mechanical operation points and the mechanical switch position signals must be placed within a synoptic mimic diagram on a clear to use operator panel. It shall be at an acceptable operation height and size. The front of the switchgear is to have a uniform, flush, appearance.

Great importance is attached to maximum clarity and intuitive operator guidance of the Switchgear for mechanical on site operation. The mechanical operation and indicator devices must be visible and available at the front, without opening of doors or coverings.

Functionally dependant elements, such as the operating device for the switchgear and the mechanical switching indicator, should be placed directly adjacent, visually linked with reasonable and clear imagery. The respective details in the IEC recommendation shall be followed.

Depending on the type of functional unit the operator panel/mimic diagram shall contain the following operation and indicators:

- Push Button for mechanical operation of the circuit breaker On and Off
- mechanical display of circuit breaker spring charging status
- mechanical spring charge accumulator for circuit breaker
- mechanical switching cycle counter for circuit breaker
- Separate operating ports for mechanical hand operation of the combined disconnector / earthing switch (ON / OFF and earthed).
- 2 / 3-position switch to operate manual and motor operation for the disconnectors and earthing switch function respectively.
- During operation of the earthing switch the vacuum circuit breaker must be switched on automatically with a mechanical link inside the drive mechanism
- mechanical position indicators display for all switching devices
- remote control with motor drive: circuit breaker, busbar disconnectors and earthing switch
- double-side interlock between the cable box cover and outgoing earth switch - (for cable tests special equipment for unearthing the outgoing cables must also be available)

1.7. Interlocking system

To ensure maximum operator safety, the switchgear must be equipped with a comprehensive interlocking system of excellent design.

This interlocking system is to integrate the cable connection compartment systematically.

Actuation of the mechanical operating lever should follow the interrogation interlock principle.

1.7.1. Mechanical interlock

Cubicle Internal mechanical interlocks:

- Mechanical operation lock for all switchgear operation, interlocked and synchronised with any remote control.
- Mechanical interlock between the functions of disconnecting and earthing
- No direct interconnection switching between earthing and disconnecting
- Operation of the circuit breaker only in defined positions of the combined disconnecter / earthing switch ON or OFF
- With operation of the earthing switch mechanism the circuit-breaker must close automatically by mechanical connection. With the earthing switch is in close position, automatically by a mechanical latch, switching off or tripping the circuit-breaker must be interlocked. Using pad-locking for interlocking the circuit-breaker is not permitted.
- Actuating levers are allowed to be inserted and removed only in defined positions ON or OFF. Only 1 element shall be actuated at any time
- -double-side interlock between the cable box cover and outgoing earthing switch - (for cable tests special equipment for unearthing the outgoing cables must also be available)
- in no case a force which could damage the drive mechanisms should be applied. This is to be realized by an interrogative interlocking system.

A manual operation must be available in the event of auxiliary supply failure.

In order to protect the operators on-site from remote activations, the control voltage must be disconnected automatically when manually operating switchgear elements.

1.7.2. Electrical interlock (over several cubicles)

The bay unit for control & monitoring ensures that necessary interlocks are provided by a wire-bound ring cable on the binary input contacts.

All further special interlocks are to be clearly specified during the engineering phase, in the case of order placement.

1.8. Checking of Voltage presence (VDS-system)

The check of voltage presence shall be done with an electronic and integrated voltage test system, in line with valid standards and instructions.

The indication should be derived from a capacitive voltage divider in the cable connection compartment.

The situation “voltage present” rather “voltage not present” must be indicated clearly.

The maintenance-free voltage detection system must work without any external energy and should monitor its connected test circuits continuously.

The status of the health of integrated voltage test systems must be monitored. Device failure should be shown clearly.

Optionally the integrated VDS-system shall be fitted with an auxiliary switch for signal and interlock purposes (VDS-indicator with auxiliary supply)

For phase comparison, suitable connections shall be provided, which have to be covered during general use.

1.9. Cable connection compartment

The cable connection compartment should be large, permitting the connection of multiple single-core cables, or three-core cables.

All types of insulated, connecting systems should be accommodated.

It is not permitted for depth to be enlarged, when 2 or 3 cable systems per phase are attached.

All cubicles have to permit outer cone or inner cone connection (outer cone is preferred) according to valid standards and instructions.

For the outer cone the bushings are front accessed and placed side by side. The cable connection is to be a minimum 680 mm from the bottom edge.

For the inner cone the bushings are front accessed and placed one behind another per phase. The cable connection is to be a minimum 425 mm from the bottom edge.

A phase change of previously connected high-voltage cables must be possible without additional cabling.

Cable checking:

For cable checking a facility shall be available for the connection of test equipment for measurement of voltage and insulation.

- a) without interfering in to the gas compartment
- b) without disconnecting the cables.

For the easy performance of cable testing, it is necessary, that the voltage transformer is easy to disconnect.

1.10. Low voltage compartment

Every functional unit shall have a separate, closed and shockproof low voltage compartment with mechanical and electrical interface for housing secondary equipment for control, protection, signalling and measuring.

Equipment may be built in to the compartment door, which must be buckle resistant.

The low voltage compartment should have a minimum height of 800 mm and a minimum depth of 350 mm.

For transport and exchange request, the low voltage compartment has to be easy removable and mountable. This has to be documented in the respective manuals.

The fitting of mechanical drive sections in the low voltage compartment is not allowed.

1.11. Corrosion protection and lacquering

Corrosion endangered steel components of the switchboards must be protected with zinc phosphate, unless made of stainless steel,.

Large areas of externally visible front parts, such as doors or covers, shall have an additional scratch-resistant textured finish.

Paint coating shall be in the colour RAL 9003 signal white.

Other RAL colours are available on request.

1.12. Transformers

The insulation material used in the construction of current and voltage transformers must be reduced to a minimum.

Transformers must be suitable for all commercially available digital protective relays.

All instrument transformers must be installed out-side the gas-tank for easy access. Changing instrument transformer must be possible without any gas-works.

All transformers shall be of conventional type. Current and voltage sensors or low power transformers are not accepted.

1.12.1. Ring core current transformer (CT)

The switchgear shall be equipped with low voltage insulated ring core transformers for outgoing current measurement, accessible in the cable connection compartment - outside the gas compartment. They shall be installed on adaption bushings. It must be possible to easily retrofit or replace the transformer, without intervention into the gas compartment as far as possible.

The transformer must be placed between the circuit breaker and the cable connection (needed for switchgear interlocking). The transformers have to be connected to earth potential.

The core performance shall be engineered according to the required measurement and protective device,

$P_{\text{transformer}} > P_{\text{consumer}}$

Overburdening of the transformers shall be avoided.

1.12.2. Voltage transformer (VT)

Metal enclosed single-pole insulated voltage transformers are to be used. Replacement must be possible at any time.

Voltage transformers are to be flanged directly (plug-in type) on the switchboard and must be disconnectable with an upstream disconnecter / earthing device, among others for a voltage test.

Equivalent voltage transformers (disconnectable) for busbar metering, installed in a separate measuring cubicle, are alternatively possible.

All voltage transformers shall be installed in the factory prior to dispatch of the panels. The installation of the VTs on site is not accepted.

2. instructions, rules and standards

The offered medium voltage switchgear must meet all the valid norms and standards:

| | |
|---|------------------------------|
| Environmental and operating conditions: | IEC 62271-1 / EN 62271-1 |
| Switchgear: | IEC 62271-200 / EN 62271-200 |
| Circuit breaker: | IEC 62271-100 / EN 62271-100 |
| disconnecter and earthing switch: | IEC 62271-102 / EN 62271-102 |
| Current transformer: | IEC 61869-2 |
| Inductive voltage transformer: | IEC 61869-3 |
| Voltage test system: | IEC 61243-5 / VDE 0681 |
| Contact, contaminant and waterproofing: | IEC 60529 / EN 60529 |
| Assembling: | HD 637 S1 |
| Operation of electrical switchgears: | EN 50110-1 |

Device connection:

IEC 50181 / EN 50181

3. Switchgear

3.1. Circuit breaker

The Circuit Breaker shall have a breaking capacity equivalent to the system fault level.

The vacuum circuit breakers must have a minimum life of 10,000 cycles at rated current (p.f. 0.7) and a minimum of 100 breaking operations at rated short circuit breaking current.

It is to be considered that:

- drives are placed outside the gas compartment;
- drives shall be fitted both with manual and motor drive and shall have
- auto reclosing capabilities
- low voltage connection shall be carried out as plug type

3.2. Three-position combined disconnecter / earthing switch

Setting of the three-positions:

On: The connections between busbar and circuit breaker are closed.

Off: The connections between busbar and circuit breaker are opened.

Earthed: The contacts are linked with the earth contact and the outgoing (cables) is earthed by an automatic closing of the circuit breaker.

It is to be considered that

- drives are placed outside the gas compartment;
- drive mechanism shall be fitted both with manual and motor;
- low voltage connection must be carried out in plug type.
-

In addition to integral earthing, the switchgear must also be mechanical operated via a three-way switch and vacuum circuit breaker, like conventional switchgear.

4. Auxiliary Circuits

4.1. Wiring

Wiring shall be done using flexible, black or green-yellow insulation material halogen free with the following cross sections:

- Control 1.0 mm²
- Voltage transformer wires 2.5 mm² (from LV circuit breaker 1.0 mm²)
- Current transformer wires 2.5 mm²
- Ring wire 2.5 mm²

The terminal strip material shall be Phoenix type.

4.2. Protection and Control System (IED)

The protection relay associated with circuit-breaker shall be digital .

The relay manufacturer shall have a valid ISO 9001 and ISO14001 certification.

The relay manufacturer shall have a long term experience in designing and manufacturing Digital Protective Relays linked to switchgear applications and have relevant business volume and references in order to provide credibility in his commitments and a long term support capability.

The manufacturer/supplier shall have a permanent representative office with a trained and skilled support staff, in the country or in the region where the Digital Relays are delivered, in order to prove his commitment for local or regional support and to provide a channel for communication.

The manufacturer shall be able to offer commissioning of the Digital relay to be carried out by the local or regional office.

One common relay's management software (based on standard Windows operating systems) shall provide all necessary tools and functions to operate the devices. Via the management software relay parameters, configurations and recorded data can be exchanged between PC and the device.

The devices shall meet the applicable IEC design standards.

4.3. Voltage Presence Indication System – VPIS

Each switchgear function shall be equipped with a VPIS (Voltage Presence Indication System) according to IEC 62271-206 having the following characteristics:

VPIS will allow the visualisation of Voltage presence on each phase with LED indication. They shall be fitted with:

- 3 dedicated plug points for connection of a Phase Concordance Unit (PCU). These plugs shall include a system to protect them from humidity, salted spray or pollution when PCU is not connected as well as designed in such a way that short-circuit or failure on the PCU or its plugs does not disrupt LED display. Supplier shall propose a Phase Concordance Unit to work with his VPIS.
- Additionally to the 2 previous functions, as a specific VPIS option, outputs to Voltage presence relay

As component, their characteristics shall cover:

- Operating temperature range from -25°C to +85°C according to IEC 60068-2-14
- Conformance to EN 60068-2-11 for salt fog test up to 192 hours at 35°C
- Compliant to EMI/ EMC as per IEC 61000-4-2 Criteria B with ±8kV discharge (air) & ±6kV discharge (contact)

4.4. Voltage Detection relays

Each switchgear function shall be optionally equipped with a Voltage Detection Relay having the following characteristics:

- It shall provide information of the presence and the absence of voltage with 2 relays.
- Two relay outputs shall be separate & shall work independently. And shall have possibility to use either in Direct or Reverse order.
- The voltage signal shall be taken from the Voltage Presence Indicator System.
- The voltage detection device shall have LCD display to indicate MV network voltage in percentage of the network service voltage.
- Device shall have two LED's to indicate Voltage presence & voltage absence function.
- Device shall have the possibility for delayed indication by the relay configurable up to at least 15 minutes.
- It shall be capable for auto calibration of the device. However calibration using push buttons shall be possible.

- Various combination of voltage detection shall be possible: Ph-N or Ph-Ph voltage and unbalanced voltage.
- In case both fault passage indication and voltage detection functions are required, one single device integrating both functionalities shall be used.
- Settings can be done by micro switches and by the push button switches.
- Shall be supplied by either 24V or 48VDC auxiliary power supply
- As component , Voltage detection relay shall be tested for:
 - an operating temperature range from -40°C to 70°C according to IEC 60068-2-14
 - an insulation resistance IR > 100 MΩ, 500V, 1 min according to IEC 60255-5
 - a compliancy of EMI/EMC to IEC 61000-6-2 & IEC 61000-6-4

5. Content of offer

The offer for the implementation of this project shall cover:

- price for Design, Manufacture, delivery and installation of a metal-clad, factory-built, type-tested, gas insulated single busbar switchgear with fixed integrated switching devices included
- accessories
- freight and packing
- electrical and mechanical documentation
- transport into switchgear room and installation on-site
- engineering, building management, coordination and clearance of the implementation planning
- documentation / installation site inspection

The switchgear is to be designed to comply with the detailed requirements of the technical instructions and specifications of this contract document. Product specific variances must be detailed and explained in the offer.

Extensive documents, such as brochures, system configurations, a single-line circuit diagram, overview of the offered system configuration and a drawing showing the necessary minimum space requirement in the switchboard room must be enclosed in the offer.

- The plan view drawing must contain the following information:
- required length, width, height and footprint of the switchboard room
- required double floor height, or cable trench details
- placement of the switchgear in the mechanical room
- necessary distance between switchgear and walls

6. Technical characteristics (i.e. to be checked by Specifier on case-by-case basis)

6.1. Switchgear

| | |
|---|-----------------|
| rated voltage | 36 kV |
| rated operational voltage | 30 kV |
| rated frequency | 50 Hz |
| rated short-time withstand current | 25 kA |
| rated short-circuit duration | 3 sec |
| rated peak withstand current | 63 kA |
| busbar rated current | 1250 A |
| insulating medium | SF ₆ |
| SF6-operating relative pressure at 20°C | 500 hPa |

Auxiliary supply for:

| | |
|------------|----------|
| control | 110 V DC |
| signalling | 110 V DC |
| activating | 110 V DC |
| motor | 110 V DC |

Degree of protection

| | |
|---------------------------------------|------|
| degree of protection MV-parts | IP65 |
| degree of protection drive | IP3X |
| degree of protection LV cabinet | IP3X |
| degree of protection cable connection | IP3X |

Internal Arc fault Classification IAC AFL 25 kA, 1s

Ceiling height of substation 2.8 m

Service conditions

| | |
|------------------------|--|
| height of installation | 1000 m over Sea level |
| ambient temperature | max. + 40°C; max 24h- +35°C; min. -5°C |

Dimensions

| | |
|----------------------------------|-------------------------|
| panel width (incomer, outgoings) | max. 600 - 900mm |
| switchgear height | max. 2400 mm or 2800 mm |
| switchgear depth | max. 1600 mm |

6.2. Three-pole vacuum circuit breaker

According to IEC 62271-100 / EN 62271-100

with 1 shunt release ON

with 1 shunt release OFF

with auxiliary switch

with manual and motor drive

with mechanical operating cycle counter

with auto reclosing possibility

rated short-time withstand current 25 kA/1sec

rated peak withstand current 63 kA

6.3. Three-position combined disconnecter / earthing switch

According to IEC 62271-102 / EN 62271-102

settings ON, OFF, EARTHED

with manual [and motor drive] for disconnection

with manual [and motor drive] for earthing

with auxiliary switch for disconnection

with auxiliary switch for earthing

7. Technical characteristics of the offered switchgear

rated voltage [XX] kV

rated frequency 50 Hz

| | |
|--|------------------------|
| rated short-time current (thermal) | [XX] kA |
| rated short circuit duration | [XX] sec |
| rated peak current (dynamic) | [XX] kA |
| rated busbar voltage | [XX] A |
| insulating medium | SF ₆ |
| SF ₆ -operating pressure at 20°C | [XX] hPa |
| alarm pressure 1 | [XX] hPa |
| alarm pressure 2 | [XX] hPa |
| Auxiliary supply for: | |
| control | [XX] V DC |
| signalling | [XX] V DC |
| activating | [XX] V DC |
| motor | [XX] V DC |
| Degree of protection | |
| degree of protection MV-parts | IP [XX] |
| degree of protection drive | IP [XX] |
| degree of protection low voltage compartment | IP [XX] |
| degree of protection cable connection | IP [XX] |
| arcing fault qualification | IAC AFL [XX] kA [XX] s |
| minimum ceiling height | [XX] mm |
| Dimensions | |
| panel width (incomer,outgoings) maximum | [XX] mm |
| panel height maximum | [XX] mm |
| panel depth maximum | [XX] mm |
| end wall width maximum | [XX] mm |
| switchgear total length | [XX] mm |

8. Equipment of cubicles

8.1. Incoming feeder

Rated current 2500 A

The rated operational current must be achieved permanently, without the use of forced cooling, according to IEC-conditions.

Equipment

| | |
|---|---|
| 1 | 3-pole vacuum circuit breaker motor drive 110V DC 1 switch-on auxiliary actuator 110V DC 1 switch-off auxiliary actuator 110V DC auxiliary switch 16-pole switching sequence O-0,3s-CO-3min-CO |
| 1 | 3-pole three-position switch for disconnection and earthing motor drive 110 DC auxiliary switch 12-pole |
| 3 | voltage transformer, built in the outgoing 1-pole insulated conversion: $/ \frac{0,1}{\sqrt{3}} / \frac{0,1}{3} \text{ kV}$ winding 1 : category 1 75 VA da-dn-winding: 3P 60VA |
| 1 | damping resistance |
| 3 | ring core current transformer conversion: 1250/1 A core 1 1 FS 10 10 VA core 2 5 P 10 10 VA |
| 1 | 3-pole cap. voltage test system in the outgoing |

Cable connection for maximum 6 cables/phases up to 630 mm².

2x type C bushings per phase

excluding cable fixing facilities, with horizontal and vertical moveable cable fixings for installing the outgoing cable.

Locking on mechanical operating interface through a round profile cylinder for the whole mechanical operating interface.

Built into the low voltage compartment (example)

- 1 device for control and supervision
- 2 2-pole automatic circuit breaker for motor drives
- 1 2-pole automatic circuit breaker for control/signalling
- 1 3-pole automatic circuit breaker for voltage transformer
- 1 1-pole automatic circuit breaker da-dn-winding
- ... diverse control and auxiliary relays for message preparation rather control

includes necessary clamps and incidentals
freight, packing, delivery, installation,
documentation and on-site assembling

8.2. Outgoing feeder

Rated current 800 A

The rated operational current must be achieved permanently, without the use of forced cooling, according to IEC-conditions.

Equipment

- 1 3-pole vacuum circuit breaker
motor drive 110V DC
1 switch-on auxiliary actuator 110V DC
1 switch-off auxiliary actuator 110V DC
auxiliary switch 16-pole
switching sequence O-0,3s-CO-3min-CO
- 1 3-pole three-position switch for disconnection and earthing

| | | |
|---|---|---------------|
| | motor drive | 110 DC |
| | auxiliary switch | 12-pole |
| 3 | ring core current transformer | |
| | conversion: | 300/1 A |
| | secondary switchable | |
| | core 1 | 1 FS 10 10 VA |
| | core 2 | 5 P 10 10 VA |
| 2 | 3-pole cap. voltage test system in the outgoing | |

Cable connection for maximum 3 cables/phases up to 300 mm²

1x type C bushing per phase

excluding cable fixing facilities with horizontal and vertical moveable cable fixings for installing the outgoing cable.

Locking on the mechanical operating interface through a round profile cylinder for the whole mechanical operating interface

In the low voltage compartment are built in:

| | |
|-----|--|
| 1 | device for control and supervision |
| 2 | 2-pole automatic circuit breaker for motor drives |
| 1 | 2-pole automatic circuit breaker for control/signalling |
| ... | diverse control and auxiliary relays for message preparation rather control |

includes necessary clamps and incidentals
freight, packing, delivery, construction,
documentation and on-site assembling

8.3. Bus section

Rated current 2500 A

The rated operational current must be achieved permanently, without the use of forced cooling, according to IEC-conditions.

Construction in one cubicle

Equipment

| | | |
|---|--|-------------------|
| 1 | 3-pole vacuum circuit breaker motor drive | 110V DC |
| | 1 switch-on auxiliary actuator | 110V DC |
| | 1 switch-off auxiliary actuator | 110V DC |
| | auxiliary switch | 16-pole |
| | switching sequence | O-0,3s-CO-3min-CO |
| 2 | 3-pole three-position switch for disconnection and earthing motor drive | 110 DC |
| | auxiliary switch | 12-pole |

Locking on the mechanical operating interface through a round profile cylinder for the whole mechanical operating interface

In the low voltage compartment are built in:

| | |
|-----|--|
| 1 | device for control and supervision |
| 2 | 2-pole automatic circuit breaker for motor drives |
| 1 | 2-pole automatic circuit breaker for control/signalling |
| ... | diverse control and auxiliary relays for message preparation rather control |

includes necessary clamps and incidentals
freight, packing, delivery, construction,
documentation and on-site assembling

8.4. Metering cubicle

Equipment:

| | |
|---|--|
| 1 | Disconnecting device for busbar voltage transformer |
| 3 | voltage transformer, outside the gas compartments 1-pole insulated, built-on the busbar 1 conversion: |

$\frac{10}{\sqrt{3}} / \frac{0,1}{\sqrt{3}} / \frac{0,1}{3}$ kV
winding 1: category 1 75 VA
da-dn-winding: 3P 60VA

1 damping resistance

In the low voltage compartment are built in:

- 1 2-pole automatic circuit breaker
for control/signalling
- 1 2-pole automatic circuit breaker
for interlocking
- 1 3-pole automatic circuit breaker
for voltage transformer
- 1 1-pole automatic circuit breaker
for da-dn-winding
- 1 voltmeter 72x72
- 1 voltmeter reversing switch
6-settings PH/PH+PH/N
voltage busbar 1 rather busbar 2
- ... diverse control and auxiliary relays
for message preparation rather control

includes necessary clamps and incidentals
freight, packing, delivery, construction,
documentation and on-site assembling

9. Switchgear attachments

End walls on the left and right hand side of the switchgear

- 2 supports for operation cranks
- 2 operating cranks for circuit breaker
- 2 operating cranks for disconnecter and earthing switch
- 4 two-bit key

Specific conditional attachments and tools, which are not listed, but are obligatorily needed, must be included as a separate surcharge in the correspondence and considered in the price composition.

10. Documentation

The construction documentation of the specification has to include as a minimum the following components:

- Installation drawing including information about base frame and floor openings
- Single line diagram
- LV circuit diagram with connecting/terminal connection tables and equipment list

The documentation components (wiring diagram, terminal connection and operating resources diagrams) have to be designed in CAD-format RUPLAN.

The construction documentation has to be created after the commissioning and filed for the approval.

Other documentation components:

- instruction handbook
- assembly instructions
- routine test reports
- transformer test records

The exact details of the documentation preparation have to be agreed in detail with the buyer after order placement.

The seller has to provide the complete documentation to the buyer after the successful commissioning and building site revision.

[Factory approval

For the medium voltage switchgear a re-inspection (final acceptance) in the factory as routine test shall be provided.

11. Freight, packing, delivery

valid for all freight methods:

- packing for [truck transport],
- freight and delivery with truck

The dimensions and weights of the transported units must be included in the offer.

12. On-site assembling

Installation of the switchgear units, devices and materials on the building site, included inserting the switching unit into the switchboard room, shall be included as well as :-

- positioning and adjustment of the switching unit onto an existing base frame
delivery and assembling of the base frame is part of the customer
- connection of the switchgear to an existing earthing system
- performance of an on-site rated standing alternating voltage test for the busbar per section

The connection of high and low voltage cable is not included.

13. Ecology and certificates

The switchgear must meet high ecological demands concerning environmental protection. This has to be demonstrated with respective certificates.

The use of materials and energy during production shall be optimized to a minimum. This is especially valid for the use of insulating material.

Ecological and low maintenance handling, with a service life of minimum 30 years, must be ensured. The usage of recyclable materials and One hundred per cent sanitation at the end of the service life has to be documented through a recycling data sheet.

A compliance statement for implementation of quality standard ISO 9001 has to be enclosed with the offer.

14. Factory witness test

A factory witness test of the ordered equipment must be included in the offer. The test is a repeat test of the routine test on 1 or 2 panel types.

Prior to the test the typicals have to be defined min. 3 weeks before the witness test.

The witness test date and program have to be fixed min. 6 weeks before the test.(Seller to inform Buyer)

15. Other tender conditions

For a quotation based on this specification, the following conditions are valid:

The limit of Primary circuit supply and performance is the connecting points of the primary cables. For secondary and control wires it is the terminals to higher plant components in the switchgear LV box.

Detail items, which are not expressly included in this specification, but obligatory for the function of the switchgear, have to be included in the quoted price and explicitly shown in the offer.

16. Dates

Submission: [DD/MM/YYYY]

Order placement: [DD/MM/YYYY]

1.phase of construction:

delivery: [DD/MM/YYYY]

on-site installation: [DD/MM/YYYY]

commissioning: [DD/MM/YYYY]

2.phase of construction:

delivery: [DD/MM/YYYY]

on-site installation: [DD/MM/YYYY]

commissioning: [DD/MM/YYYY]

3. phase of construction:

delivery: [DD/MM/YYYY]

on-site installation: [DD/MM/YYYY]

commissioning: [DD/MM/YYYY]

17. Price table

| pos. | piece | description | unit price | total price |
|--------------------|-------|------------------------|------------|-------------|
| 9.1 | | Incoming feeder | | |
| 9.2 | | Outgoing feeder | | |
| 9.3 | | Bus coupler | | |
| 9.4 | | Metering cubicle | | |
| 10 | 1 | switchgear attachments | | |
| | | | | |
| | | | | |
| Grand Total | | | | |

additional legal valid VAT

Above stated prices apply to delivery and performance until [\[DD/MM/YYYY\]](#)

Binding period of the offer until [\[DD/MM/YYYY\]](#)

..... ,

Company stamp and obligatory
Signature of the contractor