

**TECHNICAL OFFER**  
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## 1. INTRODUCTION

### **Metal-clad Switchgear and Controlgear up to 24kV - PIX Type**

The PiX Switchgear panels are type tested Metal-clad Switchgear panel made in compliance with IEC 62271 and designed for installation in :

- > Electrical power stations,
- > Distribution substations and
- > Transformer substations

This metal-clad cubicle makes use of the maintenance-free vacuum, type HVX, mounted on withdrawable truck. The switching device and the truck work with high precision and can be easily operated.

A special trolley is used to move the circuit breaker outside the panel on which it is placed and interlocked. Safety and easy transport are so guaranteed.

### **Installation**

PIX panels can be lined up in single or double rows and extended at either end without any problem. Moreover they can be erected against a wall without functional disturbances.

### **Operation**

The circuit breaker may be moved into service and disconnected/test position when the front is closed.

In the disconnected position the isolation conditions to the busbars and to the outgoing feeder are fulfilled in accordance with the IEC requirements. After opening the front door, the switching device may be removed from the panel. A low voltage auxiliary plug, which manually connects the circuit breaker with the low voltage compartment, follows the operation.

### **Interlocking system**

All the switchgear panel type PIX are equipped with a mechanical interlocking system which covers all the basic functions of the cubicle. This friendly working interlocking system allows permissible operations only.

If necessary, the mechanical interlocking system may be completed with an electrical interlocking system remaining active and fully safe even in case of auxiliary supply failure.

### **Measuring transformers**

Conventional post type current and voltage transformer are installed in the cable compartment.

Busbars and cable voltage transformers can be supplied fixed mounted or mounted on a withdrawable truck. Both versions are available with primary fuse protection.

### **Quality assurance**

Our Quality - Environment Health and Safety (QEHS) Management system has been certified to ISO 9001:2000 (since Aug. 1994), ISO 14001:2004 (since Oct. 2004) and OHSAS 18001:1999 (since Oct. 2006). The certification and assesment by SGS and accredited by UKAS.

### **Features PIX switchgear**

#### **\* High personnel safety**

- > Robust metal-clad cubicle
- > Fully segregated compartments
- > Automatic safety metal shutters between circuit breaker and busbar/cable connection compartments
- > All pressure relieves located at the top of cubicle
- > High speed earthing switch with making capacity

#### **\* High operational safety**

- > Interrogative interlocking system
  - > All operations performed from the front of the cubicle
  - > Operating and moving of the circuit breaker behind a closed door
  - > Assured manual low voltage auxiliary plug
-

\* **Solid construction**

- > Folding and welding technologies forming a robust panel frame
- > Pressure resistant solid stroke door for the circuit breaker compartment
- > Front doors painted RAL 9003
- > Minimum of solid insulation materials
- > Manufactured according to ISO 9001 quality standards

\* **Easy installation and cable connection**

- > Easy cable access through separate front door and spacious cable compartment
- > Horizontal segregation between circuit breaker and cable compartment can be easily removed for erection and cable connection.

\* **Long, maintenance-free operating time**

\* **KEMA type tested**

## 2. DESCRIPTION OF THE SUPPLY

Please refer to attachment "BILL OF MATERIAL"

## 3. GENERAL CHARACTERISTICS

### SWITCHBOARD

Rated Voltage	: 12kV
Service Voltage	: 11kV
Frequency	: 50Hz
Neutral (network)	: Solidly Grounded
Rated power frequency test voltage (50 Hz / 1min)	: 28kV
Rated impulse test voltage	: 75kV peak
Rated short time withstand current	: 40kA/3sec
Rated current of main busbars	: 1250A
Circuit breaker:	
> Breaking capacity of CB	: 40kA/3sec
> Closing capacity of CB	: 100kA peak
> Circuit breaker operating cycle	: O-0,3s-CO-15s-CO
> Spring charging motor	: 48VDC
> Shunt tripping coil	: 48VDC
> Shunt closing coil	: 48VDC
> Anti-pumping relay	
> Open/Closed : 16 poles (1W+8NO+7NC)	
> Service & Test position: 2NO + 2NC	
> Operating counter	
Auxiliary supplies:	
> Protective relays	: 48VDC
> Digital measurement	: 48VDC
> Control & signalling	: 48VDC
> Interior lighting	: 220/230VAC
> Heating resistor	: 220/230VAC
Degree of protection (enclosure)	: IP4X
Finished colour	: RAL 9003
Cable entrance	: Bottom Entry (Standard)
Altitude above sea level	: Upto 1000m (Standard)
Ambient temperature	: Upto 40°C (Standard)
Average of 24hrs max temperature	: 35°C
Average Relative Humidity over 24hrs periode	: 95%
3 Phase Earthing Switch auxiliary contacts	: 2NO + 2NC

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#### 4. APPROXIMATE DIMENSIONS AND WEIGHT (PER CUBICLE)

Please refer to attachment "BILL OF MATERIAL"

#### 5. STANDARDS

The specified equipment is designed, built, and tested according to the following IEC standards:

- > Switchboard IEC 62271-200
- > Circuit Breaker IEC 62271-100
- > Contactor IEC 60470
- > Current Transformer IEC 60044-1
- > Potential Transformer IEC 60044-2
- > Protective Relays IEC 60255

#### 6. STEEL SHEET

The cubicle is made of galvanized steel sheet having thickness upto 3mm for frames and 2mm for partition, covers and doors.

#### 7. SURFACE TREATMENT AND PAINTING

All the sheets are galvanized.

The frame and internal steel parts are not painted.

Only the front side (doors, panel) is painted for presentation reasons.

The treatment operation is performed as a continuous cycle on an automatic process line, ensuring a constant quality level of the treatment.

Paint is generally of thermosetting epoxy powder type.

- > Colour : RAL 9003
- > Appearance : Glass

The paint is submitted to adhesion, shock, hardness and flexibility tests.

Mechanical parts are protected by lubricated phosphating and chromated zinc coating

#### 8. WIRING

The wiring used for our equipment is as follows:

- > Multi-strained flexible copper conductor with tin coated
  - > Insulation : XLPE
  - > Rated voltage : 1000V
  - > Dielectric test voltage 50 Hz / 1 s : 2000 Volt
  - > Section:
    - control circuit : 1.5 mm<sup>2</sup>
    - voltage circuit : 2.5 mm<sup>2</sup>
    - current circuit : 4.0 mm<sup>2</sup>
    - ground circuit : 2.5 mm<sup>2</sup>
-

## 9. TESTS

### \* Routine Tests

The tests carried-out in our factory on the entire equipment are in accordance with the IEC standard that includes:

- > General conformity with the specification
- > Building up conformity to the construction drawings
- > Mechanical tests
- > Checking of interlocking devices
- > Electrical functional tests of the MV switchgear and low voltage equipment
- > Dielectric test 50 Hz / 1 minute

### \* Type Tests

No type test will be carried-out during the factory inspection but type test reports concerning similar equipment can be forwarded at customer's request.

## 10. SPECIFICATION OF THE CUBICLE

Please refer to attachment "BILL OF MATERIAL"

## 11. SET OF TOOLS

The following tools for switchboards operation will be supplied per substation as follows:

- |  |   |           |
|--|---|-----------|
| - Circuit Breaker spring charging handle         | : | (Qty = 1) |
| - Circuit Breaker manual on/off operating handle | : | (Qty = 1) |
| - Circuit Breaker's truck operating lever        | : | (Qty = 1) |
| - Earthing Switch operating lever                | : | (Qty = 1) |
| - Circuit Breaker handling carriage (trolley)    | : | (Qty = 1) |

## 12. LIMIT OF SUPPLY

Our offer includes the supply of switchgear detailed in type and quantity in this specification.

This supply does not include:

- > at site service such as supervision, setting-up, connections, commissioning and maintenance;
- > calculation, setting and coordination of protection system;
- > site test equipment;
- > training;
- > mounting tools and setting-up parts;
- > storage;
- > auxiliary supply;
- > anchor, bolt and nuts for fixing the cubicle onto floor;
- > MV cable termination & cable lugs

## 13. COMMENTS ON SPECIFICATION

The proposed equipment generally in compliance with tender requirements and are manufactured and tested in accordance with the latest edition of the IEC standards. However, we would like to clarify some specific issues concerning our proposal as the following list of comments / deviation.

Please refer to attachment "List of Comments"

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## **ATTACHMENTS**

**BILL OF MATERIAL**

**S**

**# Typical Feeder -1**

Panel Name : 630A CB Feeder  
 Quantity : 1 units

Description	Brand/Type	Technical Data	Qty/unit
<b>I. ENCLOSURE</b>			
Enclosure Code	Schneider, PV126606FH4	PIX-12, 650mm Width x 1605mm Depth x 2730mm Height	1
<b>II. BUSBAR COMPARTMENT</b>			
Main Busbar	Schneider	PIX-12, 1250A, 650mm width, 1x80x10mm insulated	3
Optional :			
- Busbar Segregation			-
- VT on Busbar (on Top)			-
- ES on Busbar (on Top)			-
- Insulation Boots for Main Bus & Cable Connection only			6
- Heating Resistor			-
<b>III. SWITCHING COMPARTMENT</b>			
Vacuum Circuit Breaker (VCB)	Schneider,	-	1
Contactors Fuse			-
Optional :			
- Manual C/O Push Button			1
- Interlock with Door			1
- Key Interlock Test Position	HF Securite, Nogapi		1
- Motorized Withdrawable			1
- Under Voltage Release (UVT)			-
- Earthing of Moving Part for Full Short Circuit Capacity			1
- Mechanical Latching			-
- Heating Resistor			-
<b>IV. CABLE COMPARTMENT</b>			
1st Current Transformer	Local	300-600/1-1A, 5P20-0.5 Class, 15-10VA	3
2nd Current Transformer			-
Optional :			
- Voltage Transformer			-
- Zero CT			-
- Surge Arrester			-
- Voltage Indicator			1
- ES Interlock w/ Cable Door			1
- Key Interlock ES Close			-
- Key Interlock ES Open			-
- Electrical Interlock for ES Close			-
- Thermographic Window			-
- Three Cores Cable Box			-
- Heating Resistor	DBK, Blizzard		1
<b>V. LV BOX COMPARTMENT</b>			
LV Box Dimension			
1st Protection Relay	SEL787 relay (to be free-issued by UON and installed by UON unless otherwise advised)		
2nd Protection Relay			-
1st Measurement			-
2nd Measurement			-
Close/Open Indication Lamp	Schneider		2
Close/Open Control Switch	K&N		1
Local/Remote Switch	K&N		1
Under Frequency Switch			-
Autoreclose Switch			-
Load Shedding Switch			-
Emergency Push Button			-
Additional Indication Lamp	Schneider		2
Additional Test Terminal Block	Entrelec, CCEVA		1
Annunciator			-
Buzzer			-
<b>VI. CUBICLE COMPLEMENT</b>			
Internal Arc Compliance (IAC)		Tunnel 1605mm depth, 650mm width	
Top Entry Rear Box			
Terminal, Wiring & Accessories			

**BILL OF MATERIAL****# Typical Direct -1**

Panel Name : Direct Incomer  
 Quantity : 1 units

Description	Brand/Type	Technical Data	Qty/unit
<b>I. ENCLOSURE</b>			
Enclosure Code	Schneider, PV126612DX4	PIX-12, 650mm Width x 1605mm Depth x 2730mm Height	1
<b>II. BUSBAR COMPARTMENT</b>			
Main Busbar	Schneider	PIX-12, 1250A, 650mm width, 1x80x10mm insulated	3
Optional :			
- Busbar Segregation			-
- Insulation Boots for Main Bus & Cable Connection only			6
- Heating Resistor			-
<b>III. SWITCHING COMPARTMENT</b>			
Optional :			
- Voltage Transformer			-
- Heating Resistor			-
<b>IV. CABLE COMPARTMENT</b>			
Optional :			
- Voltage Transformer			-
- Earthing Switch			-
- Surge Arrester			-
- Voltage Indicator			-
- ES Interlock w/ Cable Door			-
- Key Interlock ES Close			-
- Key Interlock ES Open			-
- Electrical Interlock for ES Close			-
- Thermographic Window			-
- Heating Resistor	DBK, Blizzard		1
<b>V. LV BOX COMPARTMENT</b>			
LV Box Dimension			
1st Protection Relay			-
2nd Protection Relay			-
1st Measurement			-
2nd Measurement			-
Additional Indication Lamp	Schneider		2
Additional Test Terminal Block			-
Annunciator			-
Buzzer			-
<b>VI. CUBICLE COMPLEMENT</b>			
Internal Arc Compliance (IAC)		Tunnel 1605mm depth, 650mm width	
Top Entry Rear Box			
Terminal, Wiring & Accessories			