# METALCLAD SWITCHGEAR
## 7.2 kV to 36 kV

PEKA

# ADVANTAGES OF VACUUM SWITCHGEAR TYPE PVP

## "Real" metalclad switchgear which answers the requested IEC 298 standards and even more...

**IEC 298**

**Metalclad Definition**

*Metal enclosed switchgear in which components arranged in separate compartments with METAL partitions intended to be earthed.*

PVP type factory assembled metalclad switchgear has totally sheet steel encapsulated design with the protection degree of IP4X according to IEC/BS standards.

## Type tested single and double busbar switchgears for rated voltages up to and including 36kV

PVP type single and double busbar switchgears had been fully type tested in CESI (Italy) and KEMA (Netherlands) Laboratories and all have IEC 298 (BS 5227) "Conformity Certificates" concerning the performed type tests.

## Internal arc tested switchgear for rated voltages up to and including 36kV

PVP type switchgear is designed to protect the operator working in front of the panel door or around the switchgear in the event of an internal arc fault. PVP type switchgears had been internal arc tested successfully in CESI (Italy) Laboratories fully complying IEC 298 (BS 5227) Annex AA.

## Draw-out type switchgear

PVP type switchgear is provided with a draw-out trolley, rolling on the floor, for PELKA PVB type type-tested vacuum circuit breakers or vacuum contactors. The trolley is operated without opening the front door thus providing maximum safety to the operators. Supplementary units for measurement, section isolation or external earthing are also supplied by voltage transformers, switch disconnectors and earthing switches, respectively.

(Draw-out trolley equipped with SF6 circuit breaker is also available on request)

## High performance under extreme climatic conditions

PVP type switchgear can be installed in any climate. As a standard, sheet steel parts of switchgear structure go under well accepted phosphated pre-surface treatment and come with electrocoated and electrostatic powder paint. This proven treatment has been worldwide accepted for several years to be eminently suitable even for the severest climatic conditions.

## Safety interlocks preventing maloperations

PVP type switchgear comprises all the necessary interlocks to prevent any improper operations for minimizing the operator s fault.

## Modular and extensible design

Modular construction assures the easy matching of any future extension to the both sides of PVP type switchgear easily and without the need of any special tools, by giving satisfaction both in technical and economical aspects.

## Maintenance free switchgear

Usage of PVB type maintenance free vacuum circuit breakers of PELKA permits zero maintenance of the PVP type switchgear under normal operating conditions.

## Assurance of PELKA quality and ISO 9000

Having the ISO 9002 Quality System Certificate, an ISO 9000 based quality assurance system is applied in all of the manufacturing steps of PVP type switchgear. Besides from type-tested switchgears, vacuum circuit breakers and earthing switches of PELKA, all the other basic equipment installed in the switchgear are also carefully chosen and obtained from the sub-suppliers who has either ISO 9000 or certifed by PELKA quality team.

## SWITCHGEAR CONSTRUCTION

Each PVP type switchgear unit basically comprises a 3mm thick sheet steel mounting housing and a trolley carrying the vacuum circuit breaker. The application of computer controlled high precision punching, cutting, bending and welding techniques ensures all enclosers to be identical in every dimension; rigid and distortion resistant under short circuit conditions and during transportation.

Each switchgear unit is subdivided into the following compartments;

- Busbar Compartment(s)
- Circuit Breaker Compartment
- Cable Connection Compartment
- Low Voltage (LV) Compartment

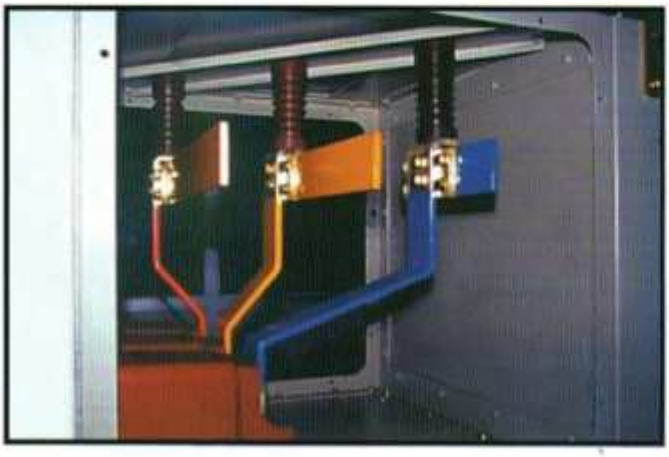
Against any improbable internal arc fault, all the high voltage compartments comprise individual pressure relief flap discharging from the top.

## BUSBAR COMPARTMENT

The busbar compartment is free of any moving part.

It contains high conductivity bare, painted, heat shrinkable coated or epoxy coated flat rectangular copper bars of proper current carrying cross section, mounted on edge and supported by epoxy resin insulators. Flat tee off connections join the busbar directly to the isolating contact spouts.

The busbars have been designed to be generally maintenance free, but access to them can be gained by removal of bolted pressure relief flap on the busbar compartment (for main busbar) and/or by opening of bolted quick access cover behind the circuit breaker compartment (for reserve busbar in double busbar system).



The end covers are easily removable to permit extention work to be carried out without disturbing the existing facilities.

## CIRCUIT BREAKER COMPARTMENT

The circuit breaker compartment is equipped suitably for insertion of the trolley mounted vacuum circuit breaker with horizontal isolation.

The trolley has both SERVICE and TEST positions within the compartment. Access to the circuit breaker is possible via a hinged and lockable front door and the trolley can be kept in both positions when the door is closed.

An interlocking bracket is mounted on the base of the compartment to guide and lock the trolley and to ensure the proper earthing of the movable structure on or between its two locations by means of a sliding earthing contact under the trolley.

Each circuit breaker compartment comprises individually operated and separately padlockable shutters for BUSBAR(S) and CABLE connections. On withdrawal of the trolley from SERVICE to TEST position, safety shutters cover the isolating tulip contacts automatically.

For double busbar systems, the trolley permits the usage of the same circuit breaker for both main and reserve busbars raising and lowering it by a special elevator system, which eliminates usage of any switch disconnector for busbar selection.

# DESCRIPTION

## CABLE CONNECTION COMPARTMENT

The cable connection compartment normally contains isolating contact spouts, cast resin wound or ring type current transformers, fixed or withdrawable type voltage transformers, earthing switch and cable termination connections with cable glands on the cable access cover from the bottom. The horizontal bus connections between current transformers and cable terminals are held by epoxy resin support insulators wherever necessary.

The type, quantity and technical characteristics of the equipment installed in this compartment are determined based on the customer s specifications and requests. To increase the security in case of any floatation, all the live parts of PVP type switchgear are positioned at least 300mm above the floor level.

Similar to the other compartments, the cable termination compartment is normally maintenance free, but any access is possible just by removal of the lower back cover of the switchgear.

## LOW VOLTAGE COMPARTMENT

The LV compartment is a solid sheet steel box on top of the circuit breaker compartment and encased separately from the high voltage section.

Based on customer s specifications protection relays, meters, control switches, indicating lamps and the other instruments are flush mounted on the hinged and lockable front door. Sufficient space is available inside the compartment to arrange all the secondary control equipment, miniature circuit breakers, auxiliary relays, terminal blocks,

## WITHDRAWABLE VOLTAGE TRANSFORMERS COMPARTMENT

Apart from the fixed type voltage transformers installed on the base of the cable connection compartment, as an alternative, withdrawable type voltage transformers can be supplied for feeder circuits, but connection to busbar circuit is also possible. In this part of the switchgear voltage transformers are installed on a handle operated withdrawal base enclosed in a seperate lockable metal housing with isolating tulip contacts and primary protection fuses. Being a part of appropriate cable termination compartment, this section has also its own pressure relief flap.

## EARTHING SWITCH

PVP type switchgear is normally supplied with integral circuit earthing. In this case, a PELKA PTB type earthing switch fully interlocked with the circuit breaker is installed in the cable connection compartment of each feeder. The earthing switch can be operated from the front (or the back) of the switchgear.

Busbar earthing can be provided as an option, alternatively, either through an integral fault making earthing switch or through a seperate busbar earthing trolley, whichever suits the customer s safety requirements.

## SAFETY INTERLOCKS

PVP type switchgear is equipped with all necessary interlocks to prevent any maloperation. Basically the following interlocks are performed in a PVP type switchgear.

- The circuit breaker trolley can be locked in SERVICE and TEST position before the breaker is operated.
- The circuit breaker can only be operated in SERVICE and TEST position when the interlocks is engaged preventing the trolley trom being moved in any direction.
- The trolley interlock can only be released if the circuit breaker is open. Therefore it is only possible to move the circuit breaker trolley in either direction between SERVICE and TEST position if the breaker is open.
- The movement of the trolley inside the circuit breaker compartment can only be done when the front door is closed by using the special tool.
- The earthing switch can not be closed when the circuit breaker trolley is in SERVICE position or the circuit breaker trolley can not be moved into SERVICE position when the earthing switch is closed.
- Replacement of a circuit breaker trolley is only possible with the identical trolleys of the same ratings, and this is secured by means of special inlerlocks.

The above mechanical interlocks are also supported by the usual and necessary electrical interlocks for each switchgear unit.

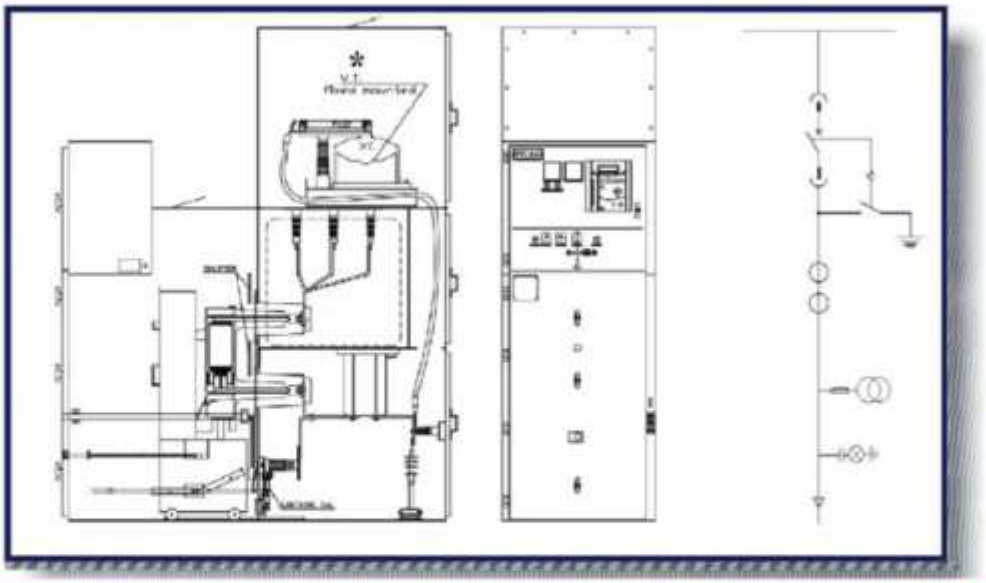

*PVB Type Single Busbar Switchgear*
*17,5 kV, 31.5 kA, 1250 A*

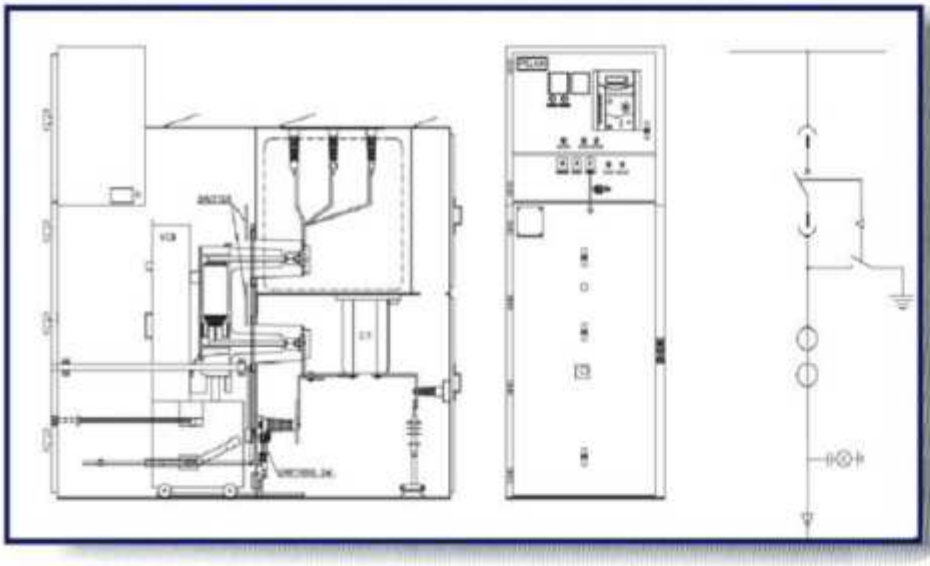
# DRAWINGS

## 7.2 -17.5 kV, SINGLE BUSBAR METAL CLAD INTERNAL ARC TESTED SWITCHGEAR

**PVP - 601**
**7.2 - 12 -17.5 kV**
**INCOMING**
**PANEL**

| Dimensions (mm) | |
|---|---|
| WIDTH | : 800 |
| DEPTH | : 2100 |
| HEIGHT | : 2600 |



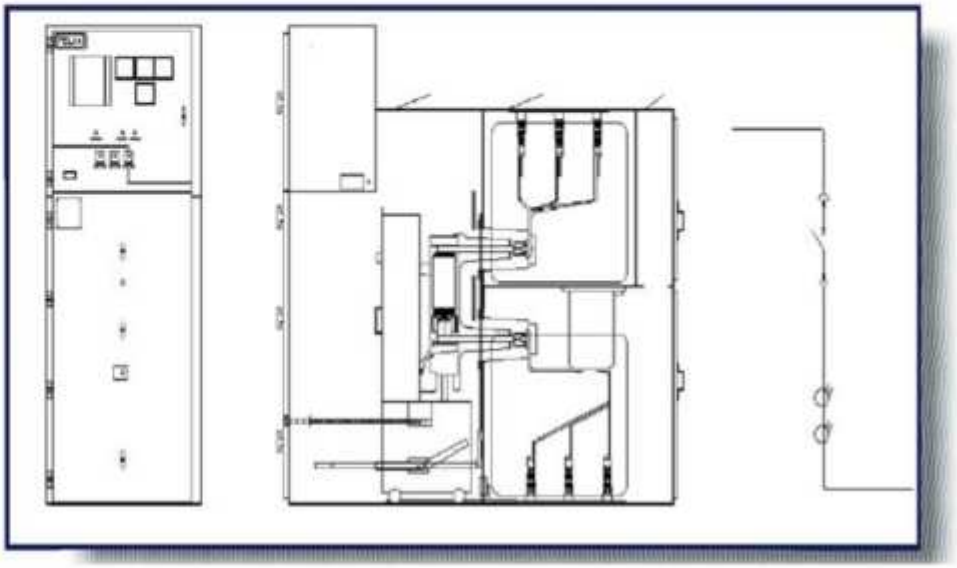


**PVP - 601**
**7.2 - 12 -17.5 kV**
**OUTGOING**
**PANEL**

| Dimensions (mm) | |
|---|---|
| WIDTH | : 800 |
| DEPTH | : 2100 |
| HEIGHT | : 2000 |

**PVP - 601**
**7.2 - 12 -17.5 kV**
**BUS SECTION**
**PANEL**

| Dimensions (mm) | |
|---|---|
| WIDTH | : 800 |
| DEPTH | : 2100 |
| HEIGHT | : 2000 |

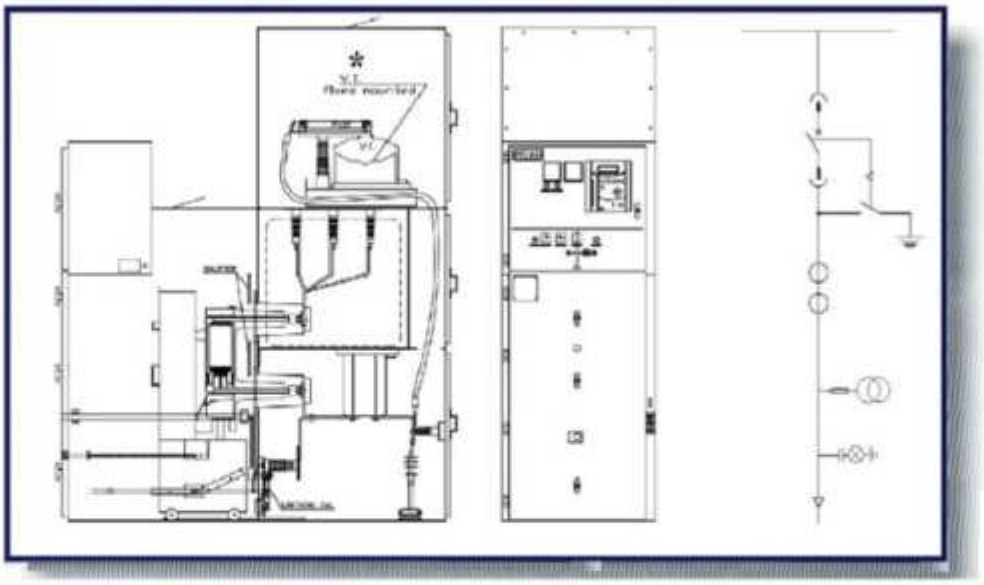


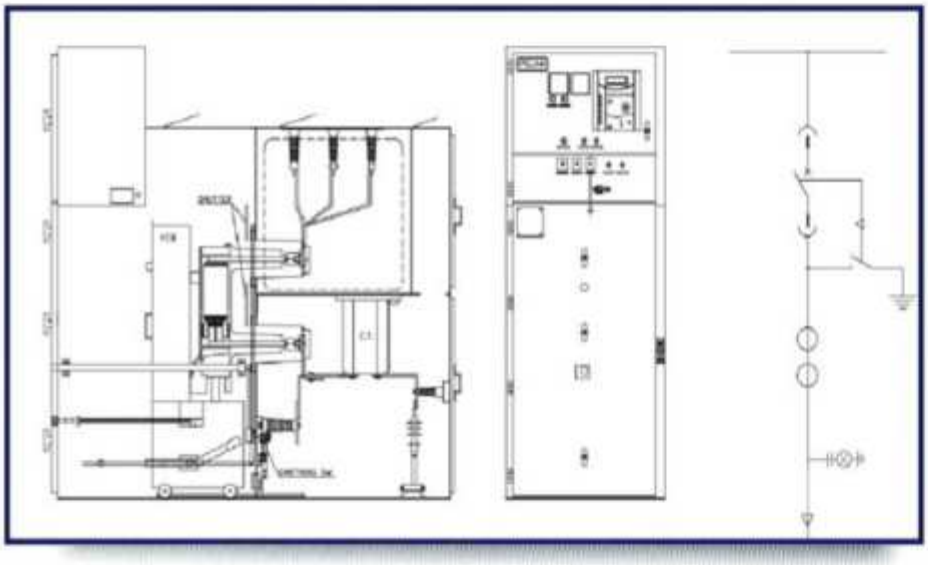
# DRAWINGS

## 24 kV, 25 kA, 2000 A SINGLE BUSBAR METAL CLAD INTERNAL ARC TESTED SWITCHGEAR

PVP - 601
24kV
INCOMING
PANEL

| Dimensions (mm) | |
|---|---|
| WIDTH | : 800 |
| DEPTH | : 2100 |
| HEIGHT | : 2600 |



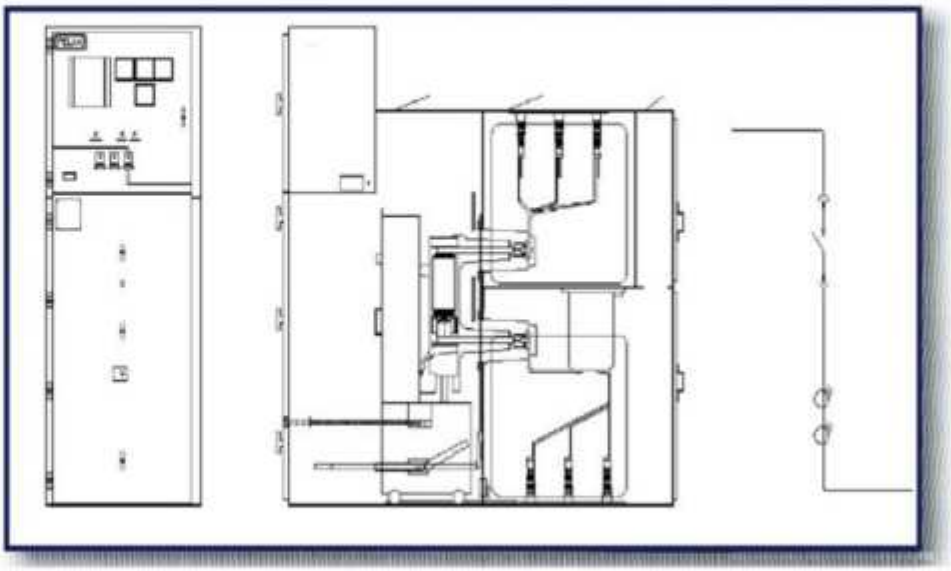


PVP - 601
24 kV
OUTGOING
PANEL

| Dimensions (mm) | |
|---|---|
| WIDTH | : 800 |
| DEPTH | : 2100 |
| HEIGHT | : 2000 |

PVP - 601
24 kV
BUS SECTION
PANEL

| Dimensions (mm) | |
|---|---|
| WIDTH | : 800 |
| DEPTH | : 2100 |
| HEIGHT | : 2000 |

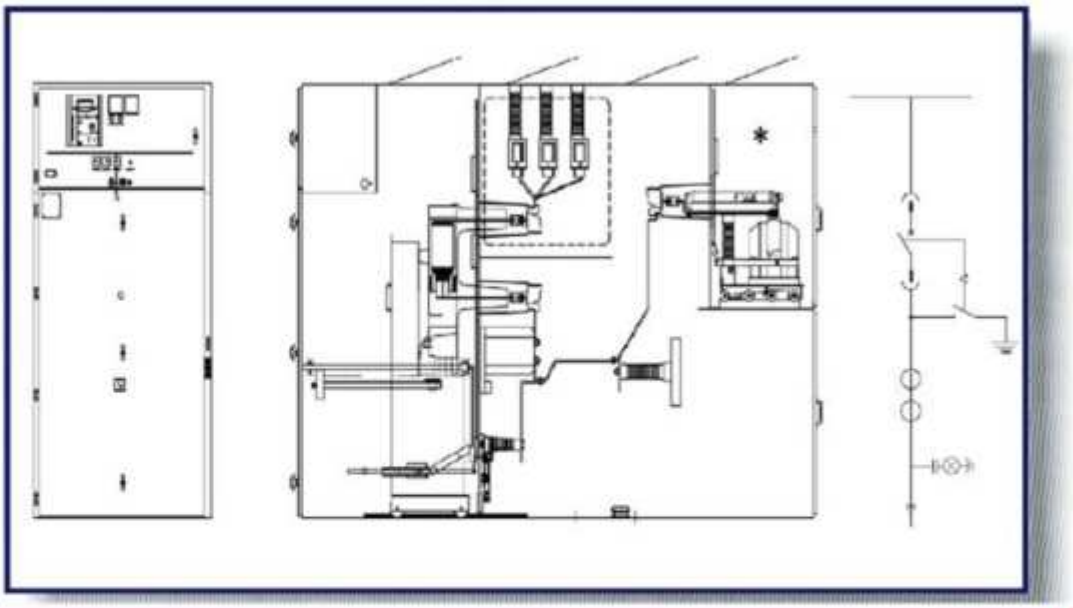


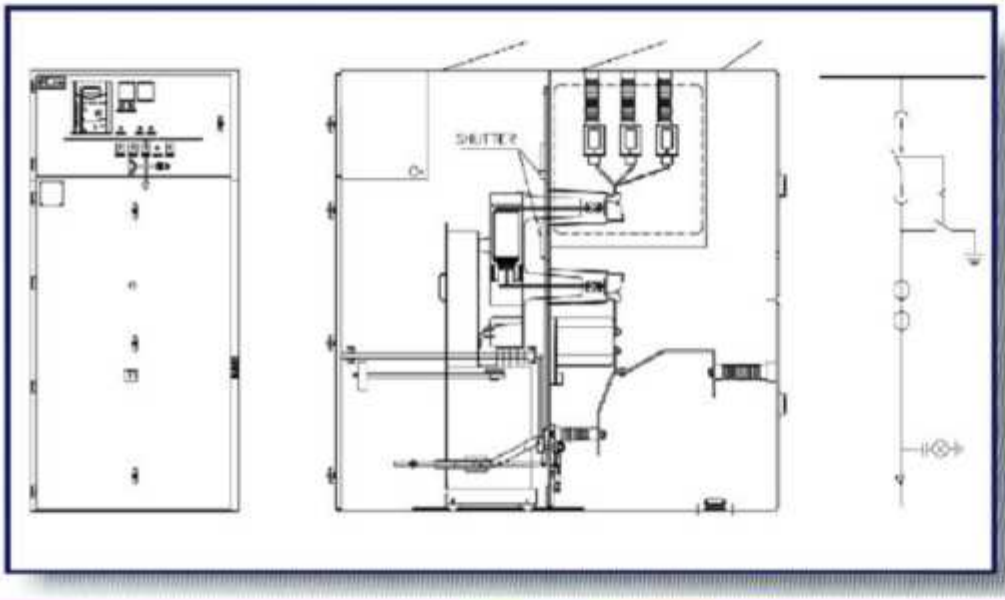
# DRAWINGS

## 36kV SINGLE BUSBAR METAL CLAD INTERNAL ARC TESTED SWITCHGEAR

PVP - 701
36 kV
INCOMING
PANEL

| Dimensions (mm) | |
|---|---|
| WIDTH | : 1200 |
| DEPTH | : 3513 |
| HEIGHT | : 2303 |



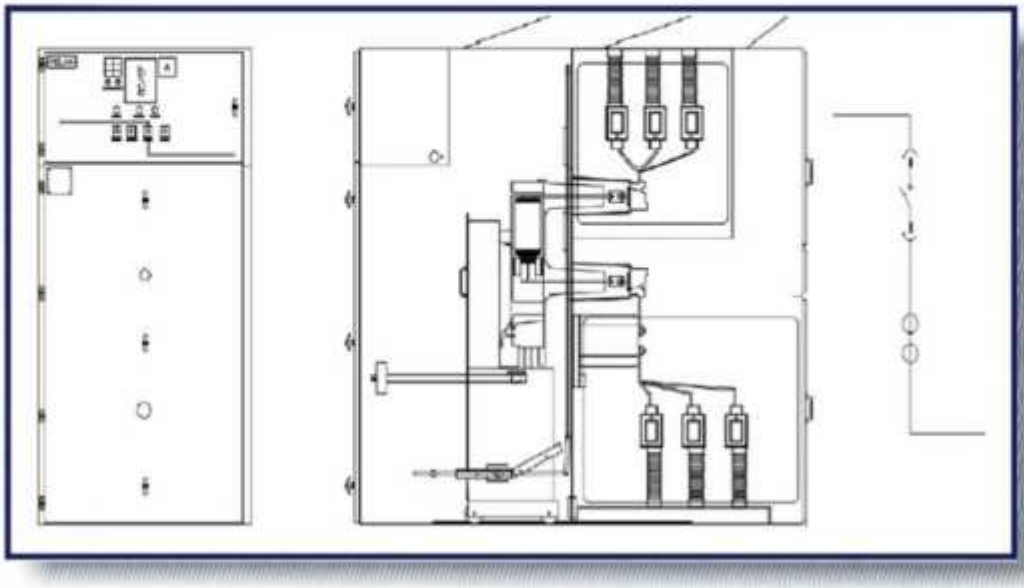


PVP - 701
36 kV
OUTGOING
PANEL

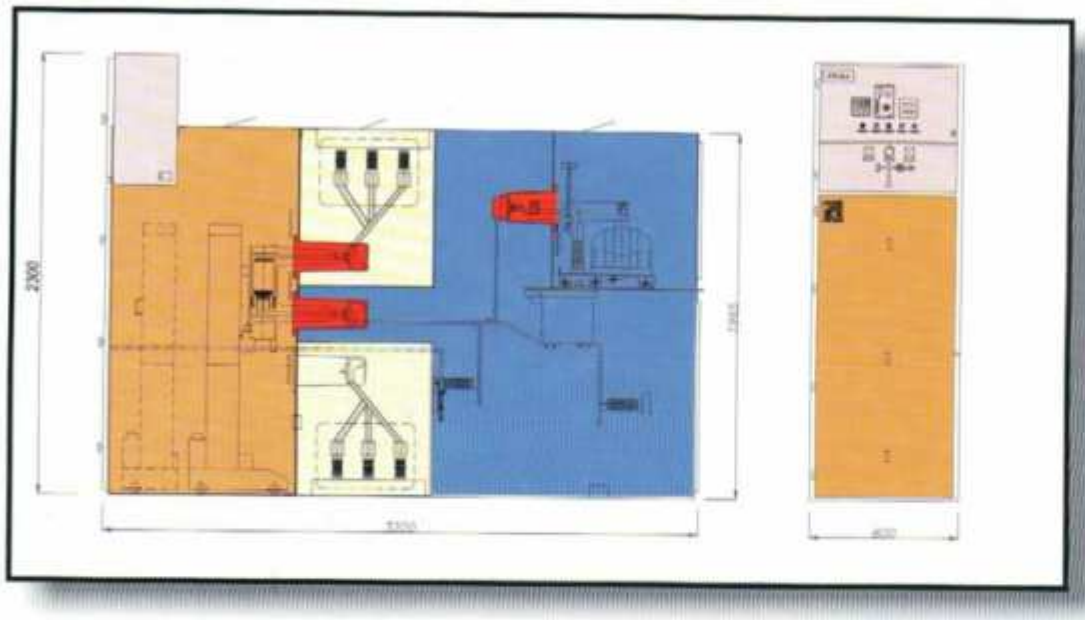
| Dimensions (mm) | |
|---|---|
| WIDTH | : 1200 |
| DEPTH | : 2553 |
| HEIGHT | : 2303 |

PVP - 701
36kV
BUS SECTION
PANEL

| Dimensions (mm) | |
|---|---|
| WIDTH | : 1200 |
| DEPTH | : 2553 |
| HEIGHT | : 2303 |

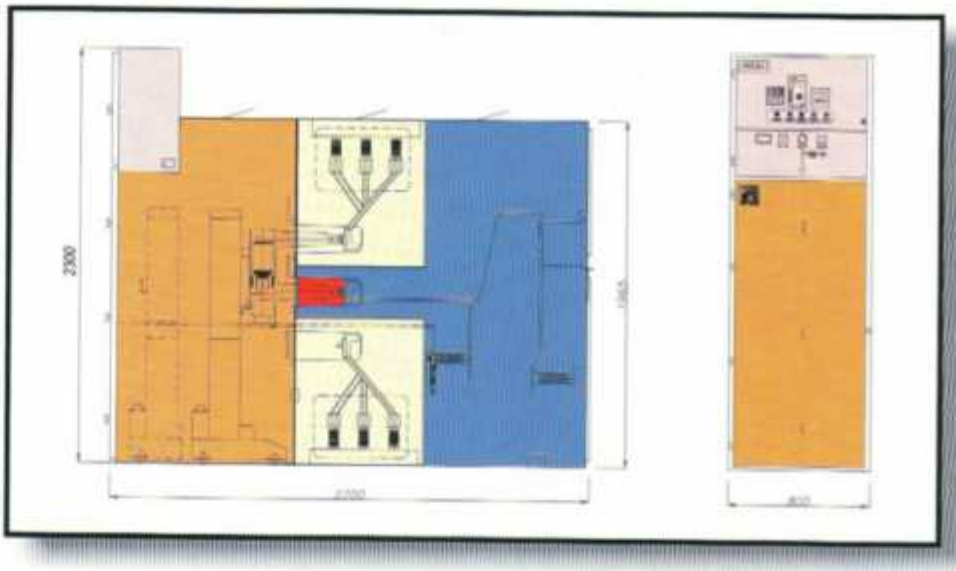


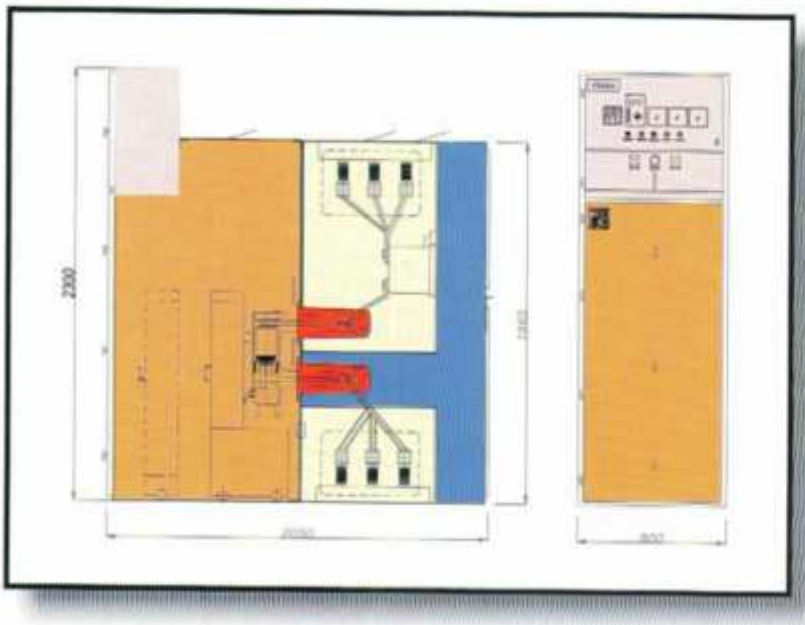
## 7.2 kV-17.5 kV, 25 KA, 2000 A DOUBLE BUSBAR. METAL CLAD INTERNAL ARC TESTED SWITCHGEAR



**PVP - 602**
**12 kV**
**DOUBLE BUSBAR**
**INCOMING PANEL**

**PVP - 602**
**12 kV**
**DOUBLE BUSBAR**
**OUTGOING PANEL**





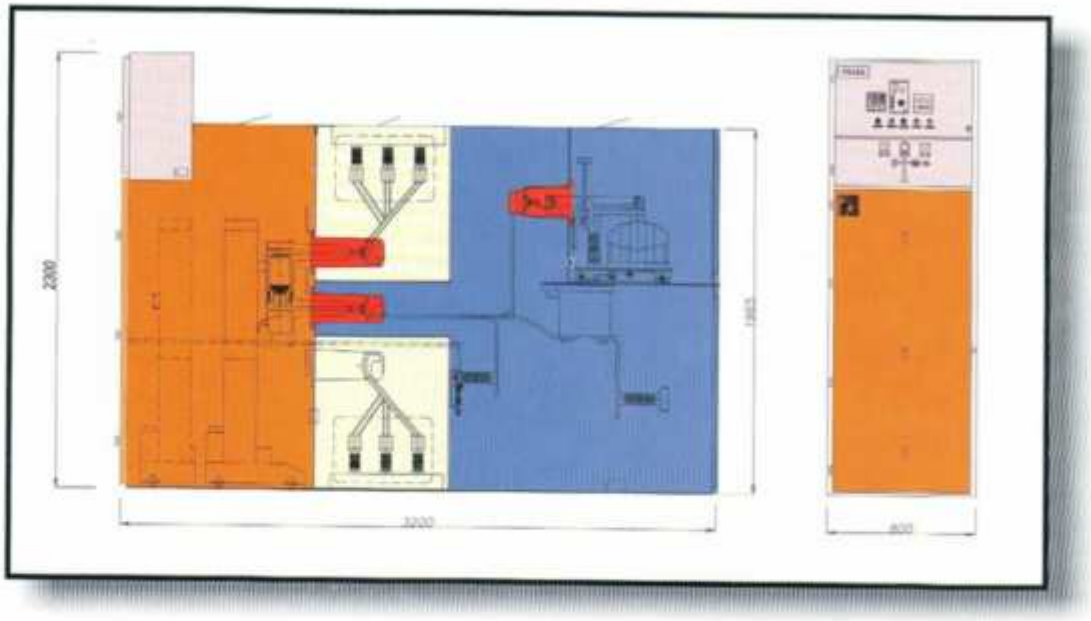
**PVP - 602**
**12 kV**
**COUPLER**
**BUSBAR BUS**
**SECTION PANEL**

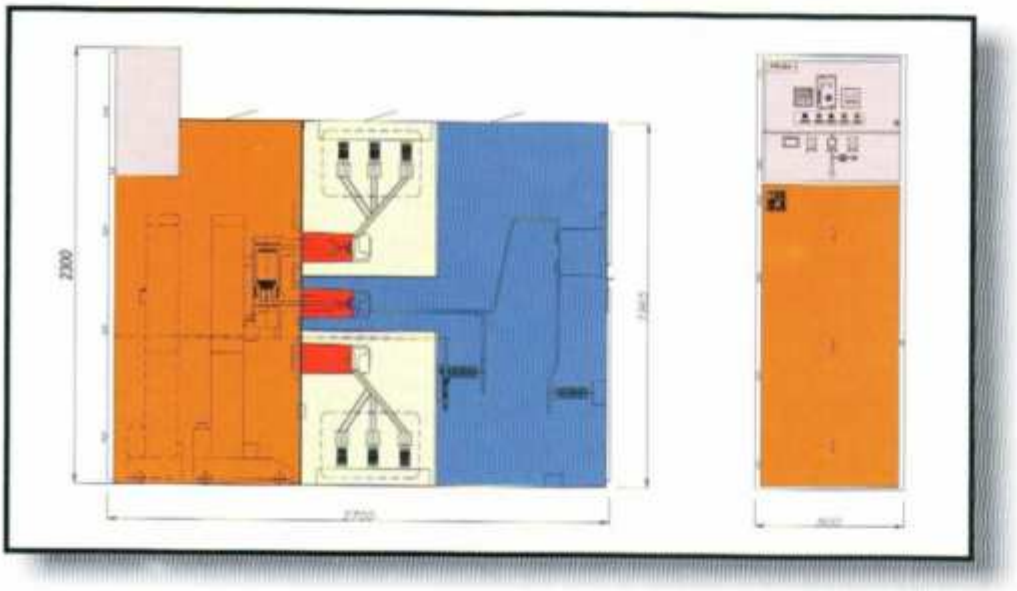
*All dimensions are in mm*

# DRAWINGS

## 24 kV, 25 kA, 2000 A DOUBLE BUSBAR METAL CLAD INTERNAL ARC TESTED SWITCHGEAR

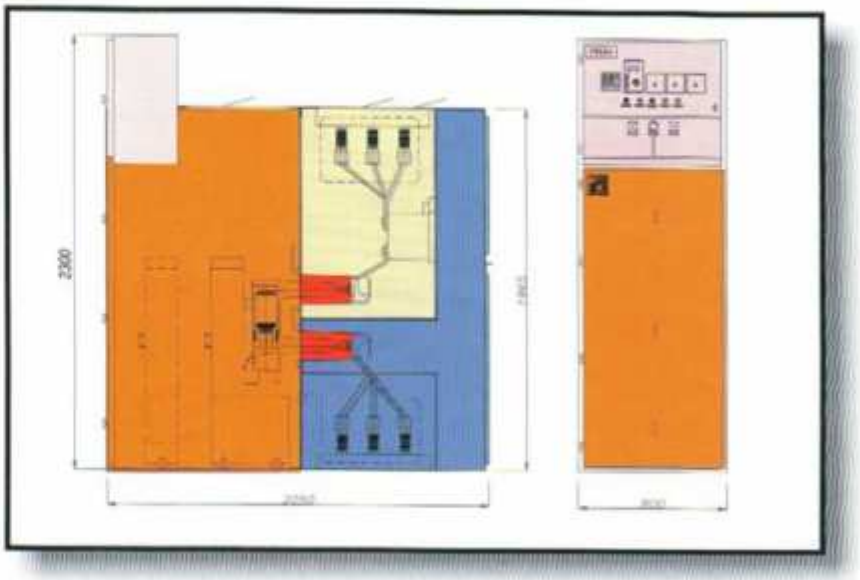
**PVP - 602**
**24kV**
**INCOMING PANEL**





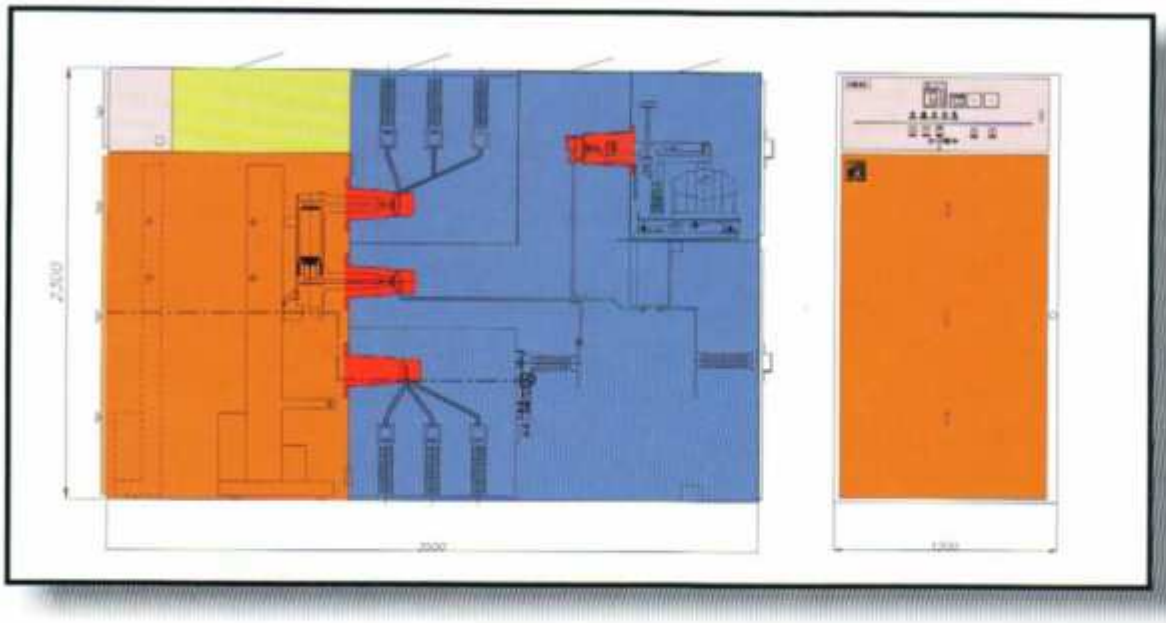
**PVP - 602**
**24 kV**
**OUTGOING PANEL**

**PVP - 602**
**24 kV**
**BUS SECTION PANEL**



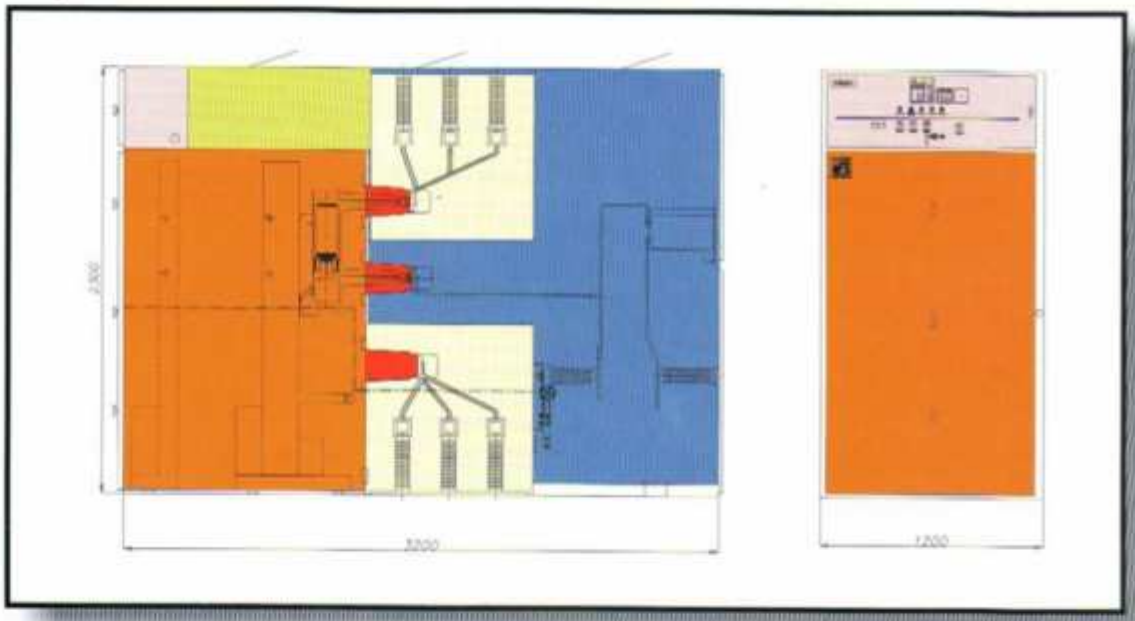
*All dimensions are in mm*

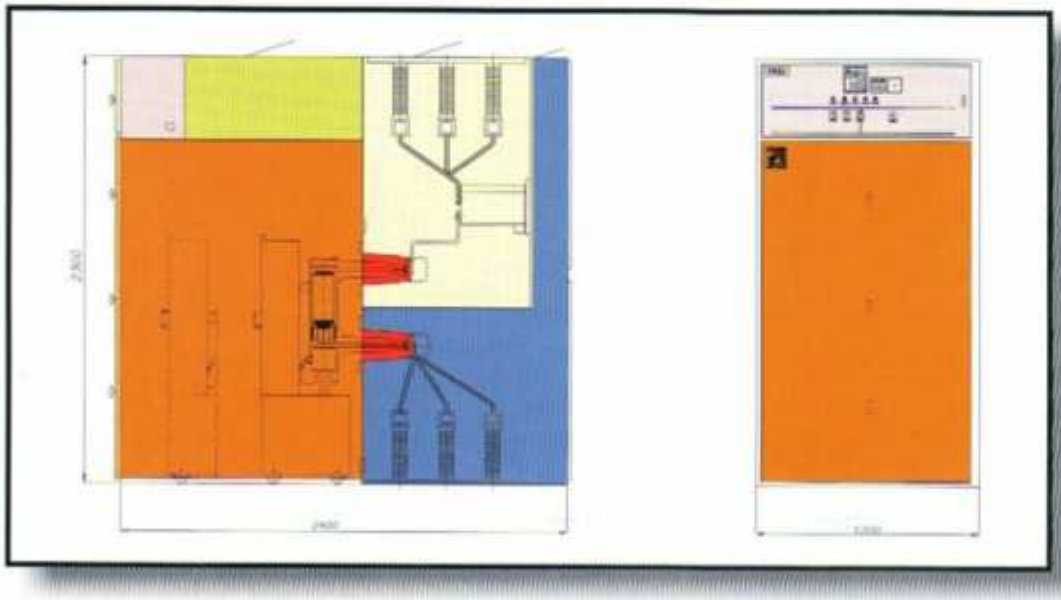
## 36 kV, 25 kA, 2000 A DOUBLE BUSBAR, METAL CLAD INTERNAL ARC TESTED SWITCHGEAR



**PVP - 702**
**36kV**
**DOUBLE BUSBAR**
**INCOMING PANEL**

**PVP - 702**
**36kV**
**DOUBLE BUSBAR**
**OUTGOING PANEL**





**PVP - 702**
**36kV**
**DOUBLE BUSBAR**
**BUS COUPLER**

*All dimensions are in mm*

# PRODUCTION RANGE

## TYPE DESIGNATION

**PVP - AOB - X / Y ( I )**

- PVP — Pelka Vacuum Panel
- AOB — Rated Voltage
  - 7 for 36kV
  - 6 for 7.2kV-24kV
- X — No of Busbars
  - 1 for Single Busbar
  - 2 for Double Busbar
- Y — Rated Normal Current in A (X 100)
- ( I ) — Rated S.C Breaking Current (3 Sec) in kA
- Used for Insulated Busbars

All the above switchgears are equipped with PELKA PVB TYPE vacuum circuit breakers.

Note PGP (Pelka Gas Panel) and PSP (Pelka Switch Panel) type of switchgears equipped with SF6 circuit breakers and switch disconnectors, respectively, are also available on request.

## TECHNICAL DATA

| Applied standards | | IEC 298/BS 5227 | | | | |
|---|---|---|---|---|---|---|
| Rated voltage | kV | 7.2 | 12 | 17.5 | 24 | 36 |
| Power frequency withstand voltage | kV | 20 | 28 | 38 | 50 | 70 |
| Lightning impulse withstand voltage | kV | 60 | 75 | 95 | 125 | 170 |
| Rated short circuit breaking current | kA | 16...40 | 16...40 | 16...40 | 16...40 | 16...40 |
| Rated short time withstand current (3s) | kA | 16...40 | 16...40 | 16...40 | 16...40 | 16...40 |
| Rated peak withstand current | kA | 40...100 | 40...100 | 40...79 | 40...63 | 40...63 |
| Rated current of the busbar | A | 800...3150 | 800...3150 | 800...3150 | 800...2500 | 800...2500 |
| Rated current of the tee offs | A | 800...3150 | 800...3150 | 800...3150 | 800...2500 | 800...2500 |
| Protection class | | IP 4X | | | | |
| Switching device | | **PELKA PVB Type Vacuum Cicuit Breakers** | | | | |

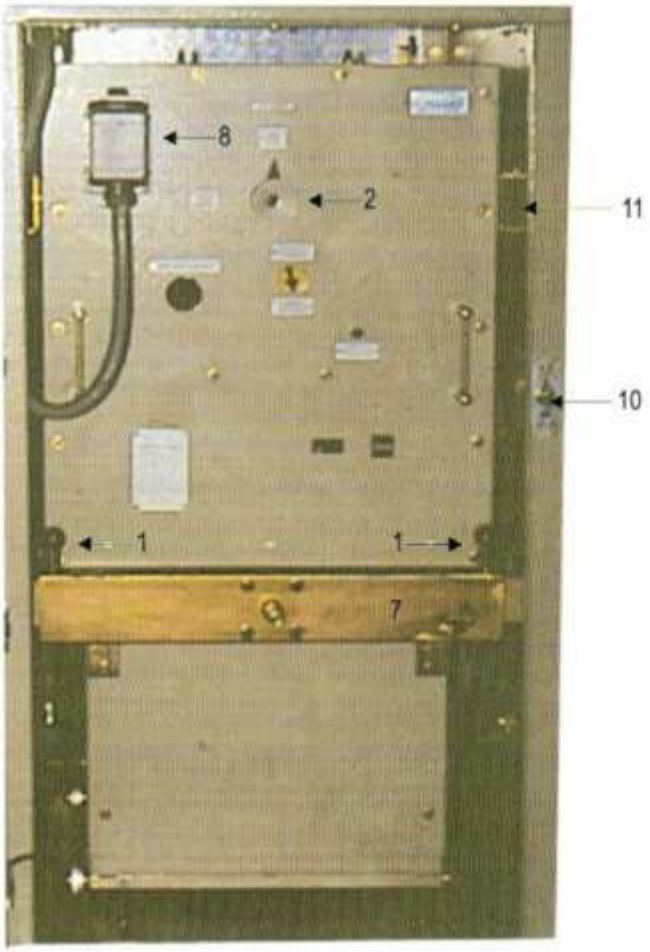
# SPECIAL OPERATING INSTRUCTIONS FOR METAL CLAD PANELS

## OPERATION INSTRUCTIONS OF THE CIRCUIT BREAKER IN THE METAL CLAD PANEL

## "BEFORE OPENING THE DOORS OF THE PANELS THE FOLLOWING OPERATION INSTRUCTIONS SHOULD BE READ"

## I INSTALLATION OF THE BREAKER INTO THE PANEL

1. The circuit breaker must be in "OPEN" position
2. The interlocking rods (11) must in the inner position "VCB UNLOCKED"
3. Push the circuit breaker into the panel up to the test position.
4. When the circuit is in the test position turn the hooks (1) on the sides of the metal belt (7) infront of the circuit breaker counter clockwise and lock them by pushing the pins with the balls inside.
5. Install the plug in its socket (8) and close the panel door.
6. Now the circuit breaker is in test position.




## II OPERATION OF THE CIRCUIT BREAKER IN TEST POSITION

1. Insert the special tool (Vcb locking tool (5)) from the hole (3) in the upper side of the door to the locking facility (7) on the circuit breaker.
2. Turn the the special tool 90° clockwise and lock the circuit breaker. (VCB LOCKED)
3. The circuit breaker can be opened and closed in this position.
4. Connect the electrical auxillary voltage in the low voltage compartment to operate the circuit breaker.
5. Close / Open the circuit breaker by turning the VCB switch on the low voltage compartment door
6. The circuit breaker can also be charged manually by inserting the special tool (12) into the hole (2) and turning it clockwise.

## III PUTTING THE CIRCUIT BREAKER TO THE SERVICE POSITION

1. Bring the circuit breaker to the test position as described in items I and II above
2. See that the circuit breaker is open
3. See that the earthing switch (if there is) open
4. Unlock the circuit breaker by inserting the special tool (5) inside from the upper hole (3) on the panel door and moving it 90° counter clock wise (VCB UNLOCKED).
5. Insert the second special tool (6) (Vcb movement tool) into the hole (4) at the bottom of the panel door and turn it clockwise until the circuit breaker is in "SERVICE" position. (The circuit breaker is in service position when the tool can not be turned any more).
6. When the circuit breaker is in service position take the special tool (6) out.
7. Lock the circuit breaker by inserting the special tool (5) (VCB locking tool) from the hole (3) in the upper side of the door and turning it 90° clockwise (VCB LOCKED)
8. Now the circuit breaker is ready for operation electrically by the VCB control switch on the low voltage cubicle.

## IV GETTING THE CIRCUIT BREAKER FROM SERVICE POSITION TO TEST POSITION

1. Open the circuit breaker.
2. Unlock the circuit breaker (VCB UNLOCKED) by repeating item III-4
3. Insert the second special tool (6) (Vcb movement tool) into the hole (4) at the bottom of the panel door and turn it counter clockwise until the circuit breaker is in "TEST" position. (The circuit breaker is in "Test" position when the tool can not be turned any more).

4. Lock the circuit breaker by repeating item II-1 and 2. (VCB LOCKED)
5. Now the circuit breaker is in test position and can be operated.

## V GETTING THE CIRCUIT BREAKER OUT OF THE PANEL

1- See that circuit breaker is in the "TEST" position and "OPEN"
2- Open the panel door by unlocking the key locks on the panel door.

**CAUTION**

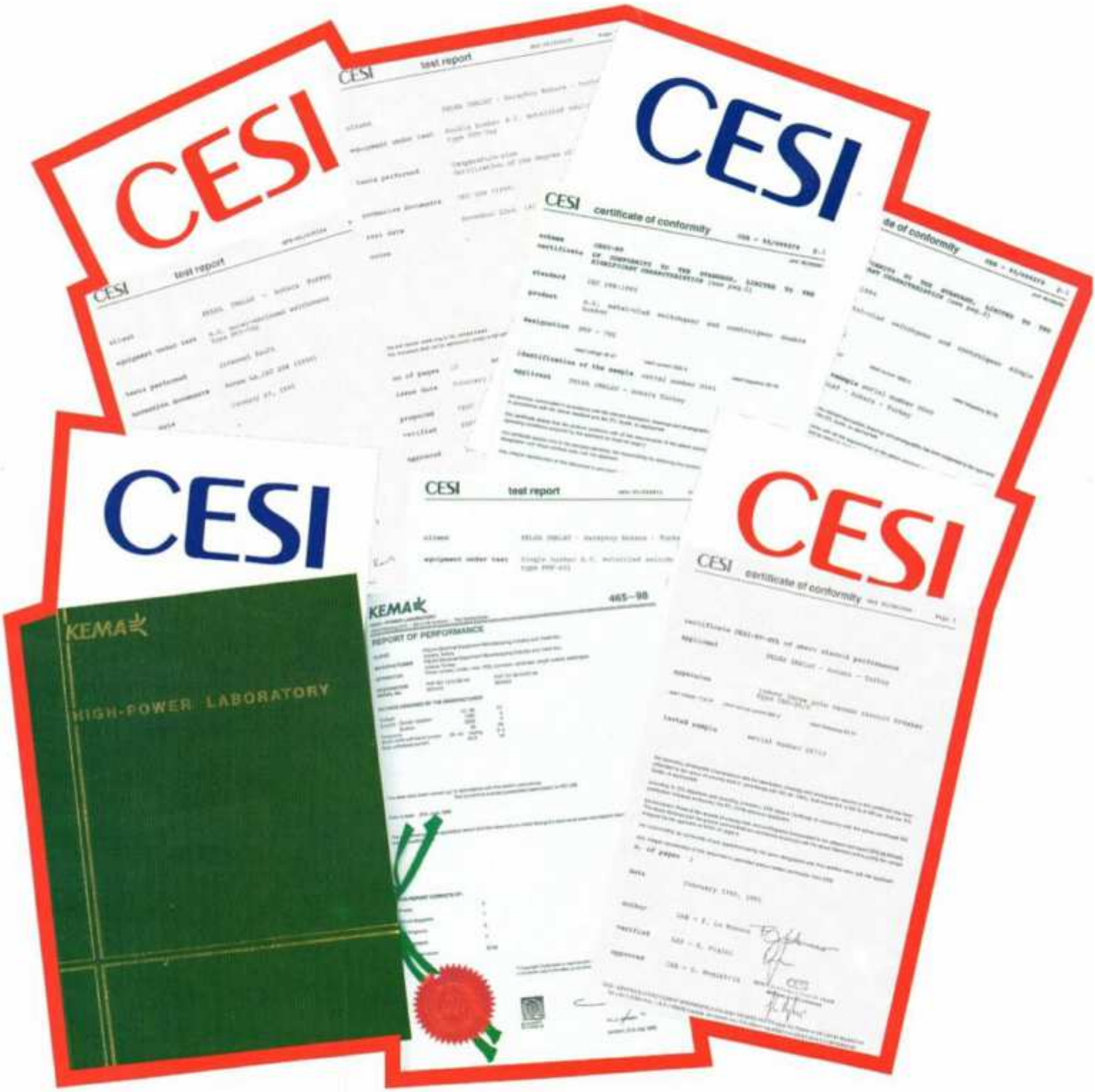
**"PANEL DOOR CAN ONLY BE OPENED WHEN THE CIRCUIT BREAKER IS IN TEST POSITION. DO NOT TRY TO OPEN THE DOOR WHEN THE CIRCUIT BREAKER IS IN SERVICE POSITION OTHERWISE YOU WILL DAMAGE THE MECHANISM"**

3- Unlock the circuit breaker by repeating item III-4
4- Unlock the circuit breaker fixing metal belt (7) by turning the hooks (1) on the belt clockwise and getting pins connected to balls out.
5- Now you can take the circuit breaker out of the panel by pulling outside.


## VI OPERATION OF THE EARTHING SWITCH

**["THE EARTHING SWITCH CAN ONLY BE OPERATED IF THE CIRCUIT BREAKER IS IN "TEST" POSITION"]**
**["IF THERE ARE OTHER ELECTRICAL INTERLOCKS THESE CONDITIONS SHOULD ALSO BE MET"]**


1- See the circuit breaker is in test position and all the electrical interlocks are free.
2- Put the earthing switch operation rod (9) into the hole (10) on the right side of the panel. If there are special electrical interlocks and these conditions are not met than the earthing switch operation rod can not be placed into the hole.
3- To close the earthing switch turn the rod (9) clockwise and hear the closing sound of the earthing switch.
4- See that the position indicator on the mimic diagram is in line with the mimic diagram.
5- When the earthing switch is closed the circuit breaker can not be put into the service position mechanically.
6- To open the earthing switch put the earthing switch operating rod (9) into the hole (10) and turn it counterclock-wise and hear the opening sound of the earthing switch.
7- See that the position indicator on the mimic diagram is 180° with the mimic diagram.
8- When the earthing switch is open the circuit breaker can be put into the service position.
9- For all the operation the auxillary supply of the panel should be on.


CESI
test report
CESI
certificate of conformity
CESI
test report
CESI
certificate of conformity
KEMA
HIGH-POWER LABORATORY
KEMA
465-98
REPORT OF PERFORMANCE

PELKA

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