

PT. INDUSTIRA
SWITCHGEAR & CONTROLGEAR MANUFACTURER



Quality
Endorsed
Company
ISO 9001 :
2000

IAS-ANZ



AMAB



INDUSCLAD 2001

24 kV MetalClad Switchgear
Factory - Assembled, Type - Tested by ◊ LMK ◊



SAFE, RELIABLE, COMPACT, MAINTENANCE FREE**TYPE TESTED TO IEC 298 , BS 5227 & L M K**

The **INDUSCLAD 2001** is the so-called factory-assembled and type-tested indoor type 24kV metal-clad switchgear, assembled under rigorous quality control and passed the careful verification tests. It is designed to accommodate high-performance vacuum circuit breaker which has been designed and manufactured in accordance with IEC58 and BS531. The switchgear itself conforms to IEC298 and BS5227, and all primary components used therein are in accordance with the relevant IEC and / or BS Standards.

The modern production process has been introduced for the manufacture of main components, primarily in sheet-metal forming, the technique of joining frameworks, insulator of main busbars and surface protection. We inform various operators of the fact that our switchgear technology assures an enormously wide range of applications and the highest possible operational reliability.



Metal-clad Switchgear with 24kV Vacuum Circuit-Breaker

CUBICLE

The cubicle framework is constructed of pre-fabricated steel plates which are riveted / welded together to form a rigid enclosure. The cubicle construction is fully metalclad as defined in IEC 298 (BS 5227).

Internally the switchgear cubicle is partitioned to provide separate compartments for :

- Busbars
- Circuit breaker
- Cable sealing end
- Auxiliary equipment (optional)

Each compartment except the auxiliary equipment compartment which houses low voltage equipment is provided with a pressure relief flap.



Front View



VCB Compartment

The standard degree of ingress protection for the cubicle is IP31, as defined in IEC 144, while for the partitions is IP2X.

Other standard features include

- Fixed covers which can only be opened with the aid of tools
- Anti condensation heater in circuit breaker and cable sealing end compartments
- Earthing conductor within the cubicle
- Front door with lock
- Multicore cable box at rear of cubicle

BUSBARS

The busbars are fabricated from high conductivity copper and are coated with epoxy or heat shrink material to provide good insulation.

POTENTIAL TRANSFORMER

PTs connected to the circuit side are placed at the rear of the cubicle bottom the cable sealing end compartment.

▷ Fixed mounted PTs with swing out primary fuse for isolation (standard)

A separate potential transformer cubicle with truck mounted PTs can also be supplied.

EARTHING SWITCH

Where required, the switchgear is provided with a fault making integral earthing switch. It is designed, manufactured, and tested in accordance with IEC 129. The earthing switch can be operated from the front of the switchgear with the use of a handle and is interlocked mechanically with the circuit breaker.

SAFETY SHUTTERS

Each safety shutter covering the busbars and circuit contacts can be operated individually.

To facilitate testing each shutter can be latched in the open position without padlocking and subsequently released into the closed position. The shutter mechanism is designed so as to be operated by the movement of the circuit breaker to ensure automatic opening and closing of the shutters.

PADLOCKING

The switchgear has provisions for padlocking in the following positions :

1. A circuit breaker truck in the service and isolated (testing) positions
2. Mechanical operating knob of the circuit breaker (optional)
3. Safety shutters in the closed position
4. The earthing switch operating handle in the closed or open position

OPERATING TOOLS

Each switchboard is provided with the following tools

VCB spring charging handle
Earth switch operating handle
VCB truck drawout handle (optional)
VCB elevating handle (double busbar switchgear only)

COMPONENTS

Vacuum circuit breaker model VJ 22 has been designed and type tested in accordance with IEC 94 85 5311.

The circuit breaker is truck mounted with rollers for easy movement. The truck is earthed in the service, isolated (test) and intermediary positions via earthing contacts.

Control and indicating devices are located on the front of the circuit breaker unit. These include manual close / open knob, manual charging slot, position switch, operation counter, close / open indicator, spring charged and discharged indicator.

The components contained in **INDUSCLAD 2001** are manufactured and tested in accordance with their relevant standard specifications.



▼
Vacuum Circuit Breaker
(Front View)



▼
Vacuum Circuit Breaker
(Rear View)

INTERLOCKING SYSTEM

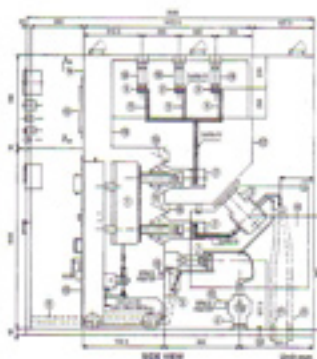
The switchgear is provided with mechanical interlocks to prevent :

- a). A closed circuit-breaker being withdrawn from or inserted into the service position.
- b). A circuit-breaker being inserted into the service position unless auxiliary circuit plug is connected.
- c). A control circuit plug being disconnected unless circuit-breaker is in the isolated (test) position.
- d). The closing of a circuit-breaker unless it is in the service or isolated (test) position.
- e). Tripping by attempted isolation.
- f). Closing of feeder earthing switch unless the circuit-breaker is in the isolated (test) or removed position.
- g). A circuit-breaker from being inserted into the service position unless the feeder earthing switch is open.
- h). A circuit-breaker from being closed unless the closing spring is fully charged.

INTERLOCKING SYSTEM FOR CIRCUIT BREAKER INSERTION / WITHDRAWAL

Operability and switching state in the Various circuit - breaker truck positions		Removed position	Isolated (test) position	Intermediate position	Service position
CB	Operable (Electrical)	No.	Yes	No	Yes
	Switching State	Open	Open or Closed	Open	Open or Closed
Earthing Switch	Operable	Yes	No	No	No
	Switching State	Open or Closed	Open or Closed	Open	Open
Circuit Connector For CB	Connected	No	Yes	Yes	Yes

APPLICATION

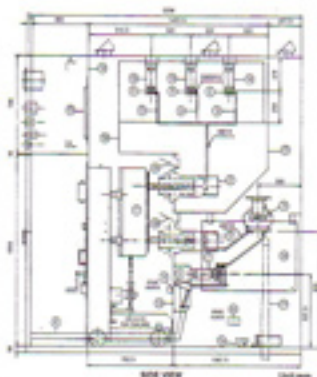


□ Incoming Panel
(Approx. 1300 kg)

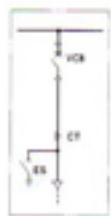
- ① Vacuum circuit breaker
- ② Isolating contact
- ③ Current transformer
- ④ Voltage transformer
- ⑤ Earthing switch
- ⑥ Operator for ES
- ⑦ Voltage detector
- ⑧ Main busbar
- ⑨ Connecting conductor
- ⑩ Insulator
- ⑪ Cable end
- ⑫ Space heater
- ⑬ Terminal block
- ⑭ Earth busbar
- ⑮ Metal shutter
- ⑯ Partition
- ⑰ Partition
- ⑱ Partition
- ⑲ Barrier



▼
Single line Diagram



□ Transformer Panel
(Approx. 1150 kg)

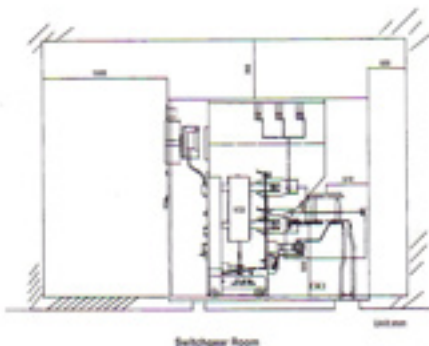


▼
Single line Diagram

ERECTION

The individual switchgear units are assembled together wired up, tested, and delivered with the VCB truck inserted. The busbars are supplied separately for transport reasons.

The cable connecting space of the switchgear is designed so that commercial cables, suitable for the rated feeder current, can be employed to connect the switchgear. Heat shrinkable cable terminations can be accommodated with in the switchgear. The switchgear room should have the following minimum size.

**MAINTENANCE**

The **INDUSCLAD 2001** is safe and simple to maintain, if work has to be carried out on particular parts of the switchgear, these parts should, of course, first be switched off and earthed. As the **INDUSCLAD 2001** has fixed fault making type earthing switches, operating and maintenance personnel are protected at a maximum safety.

TECHNICAL SPECIFICATION

SWITCHGEAR

Switchgear Model	INDUSCLAD 2001		
Switchgear Type	MC - 20 J		
Circuit breaker Type	VJ - 22		
Rating	Voltage	24 kV	
	Frequency	50 Hz or 60Hz	
	Main busbar current	1250A, 2000A	
	Circuit current	600A, 800A, 1200A, 2000A	
	Insulation level	Impulse : 125kV, Power frequency : 60kV at 1250A, 50kV at 2000A	
	Peak withstand current	63kA	
	Short-time current	25 kA-3sec	
	Breaking current	25kA	
	Breaking time	70ms	
	Making current	63kA	
Operating duty	6-3min-CO-3min-CO, 0-0.3sec-CO-3 min-CO, CO-15 sec- CO		
Specification	Applicable standard	Switchgear : IEC 298, BS 5227 Circuit breaker : IEC 54, BS 5311	
	Construction	Metal- clad Switchgear	
	Degree of protection	Enclosure : IP 31 Partition : IP 2X	
	Closing operation and tripping control system	Motor-charged spring with manual and electrical release	
	Tripping system	Shunt trip	
	Tripping control source	DC 110V (24, 30, 48, 220V)	
	Spring charge motor voltage	AC 110V (220V, 240V) DC 110V (220V)	
	Normal service condition	<ul style="list-style-type: none"> • Ambient air temperature <ul style="list-style-type: none"> • Max. 40 °C, Min - 5 °C • 24H average value does not exceed 35 °C • Relative humidity : <ul style="list-style-type: none"> • 24H average value does not exceed 95% ^{*1} • 24H average vapour pressure does not exceed 22 mbar • Altitude does not exceed 1000m. 	
	Dimension *2	Width (mm)	900, 1050 (incoming panel), 1400 (Bus-section panel)
		Depth (mm)	2250, 2500, (incoming panel)
Height (mm)		2300	

Notes : *1 According to the Standard "IEC-298 and 694" the relations "temperature to humidity" are as follows :

Temperature (°C)	20	25	30	35	40
Relative Humidity (%)	90	70	52.5	40	30

*2 Dimension shown here indicates that of standard type (main busbar rating of 1250A)