

Retrofitting of MOCB to VCB 12kV,630A ,25kA / 3Sec Indoor



NGEF – MOCB (GR Model)

S&S – VCB (HHV12)



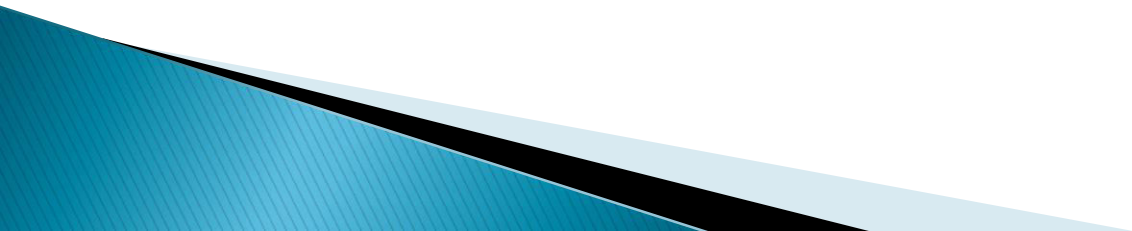
The Process flow

- ▶ **Input** : Purchase Order From EC Enterprises (for IGCAR Supply).
- ▶ **Concept Design**: Proven Design Already Supplied by S&S To IGCAR.
- ▶ **Review**: Mr.RJR & Mr.J.Sundarrajan Visited IGCAR plant & Township for Technical & Commercial Discussion with Mr.Jothishkumar, Mr.N.Djearadjane& Mr.Rajendiran
- ▶ **Design area focus**: Matching of the Truck to the Panel, Panel Interlocks (mech. & Elec.), Rear door Electrical interlock arrangement, In Existing panel separate panel door was not available. We designed swing type panel door arrangement with view glass & Emergency trip.
- ▶ **Verify**: In house- Mechanical endurance, Contact resistance, Time Interval,H.V, Megger, Shunt Coil, Charging Motor Resistance Value & Mechanical overall check.
- ▶ **Validate**: Type testing at IIT Chennai. (Impulse Test).
- ▶ **Output** : Execution of W.O.No. – SS RET - 001

Retrofitting process for Truck

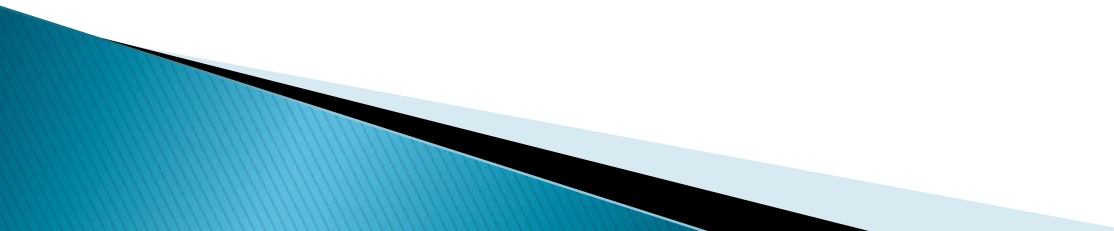
- ▶ Dismantled the existing MOCB Carriage from truck frame.
- ▶ Truck frame alone taken for Retrofitting Job.
- **Fabrication work:-**
 - Cutting of the frame to match with the panel
 - Welding of the channels on the frame for mounting of the mech. fixing plate.
- **Painting Work:-**
 - Cleaning & Removing of the welding spatters & burrs on the truck frame.
 - One coat of primer coating done.(spray painting)
 - One coat of 631 shade spray painting done.
- ▶ Mechanism Assy.
- ▶ Mechanism fitted on the truck & started all other assy. work related to the truck.
- ▶ After completion of all the mech. assy.work truck wiring was carried out.
- ▶ VCB travel settings checked and ensured.

Retrofitting process for Panel

- ▶ Rear Door Electrical inter lock done.
 - ▶ Service / Test Electrical Interlock done.
 - ▶ Panel wiring for VCB.
 - ▶ Swing door arrangement done.
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- ▶ Verification and Validation carried out as per IS/IEC – 62270-100,62271 -1

Verification for following as per IEC 62271 -1

- ▶ Mechanical endurance test.
 - ▶ Power Frequency Voltage with stand test.
 - ▶ Lightning impulse Voltage withstand test
 - ▶ Contact resistance test.
 - ▶ Insulation resistance test.
 - ▶ Time interval test.
 - ▶ Shunt Coil, Charging Motor Resistance Value.
 - ▶ Mechanical overall check.
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Check points for a Power Frequency with stand & Lightning Impulse voltage withstand test.

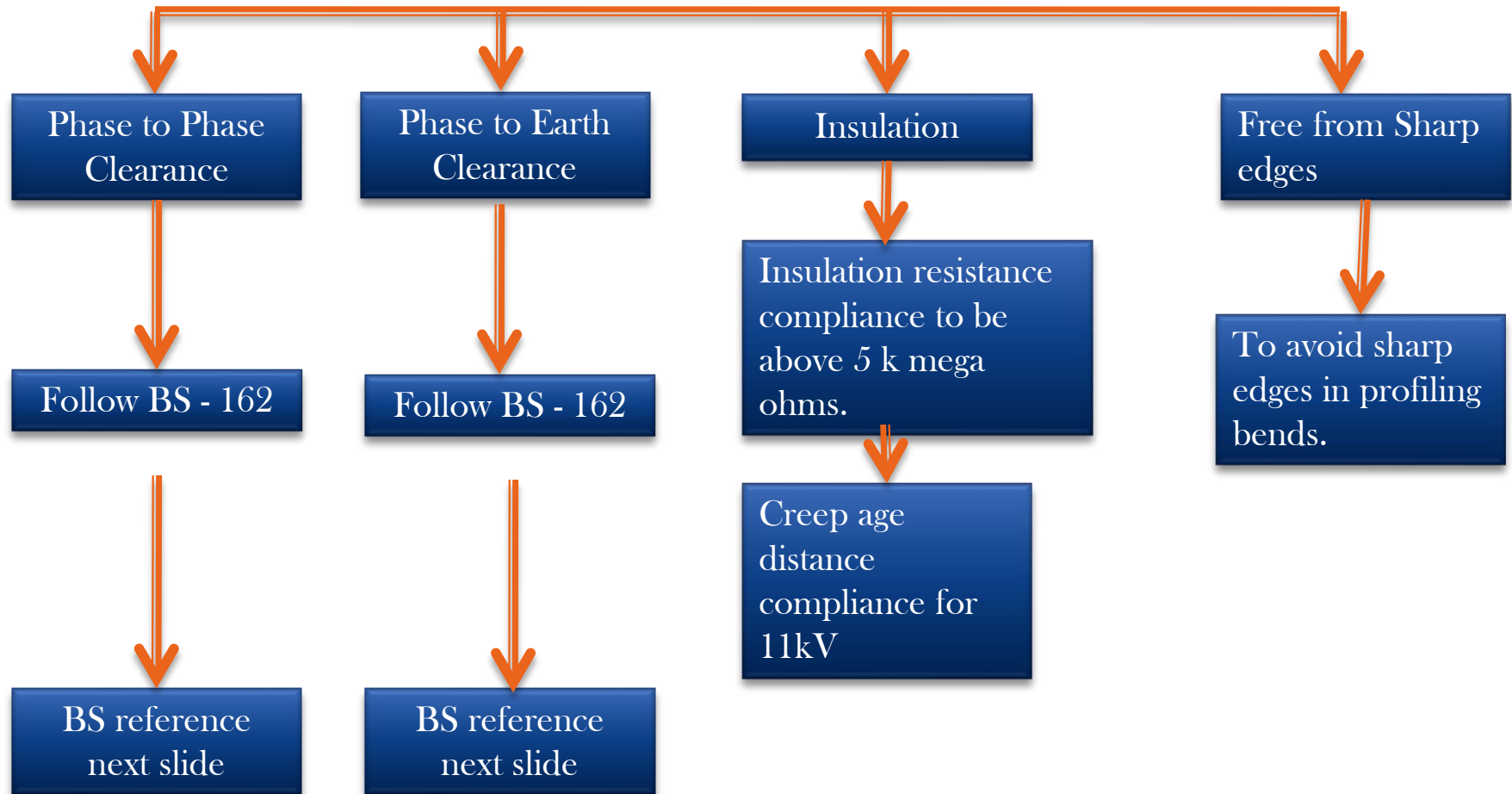


Table 1a – Rated insulation levels for rated voltages of range I, series I

Rated voltage U_r kV (r.m.s. value)	Rated short-duration power-frequency withstand voltage U_d kV (r.m.s. value)		Rated lightning impulse withstand voltage U_p kV (peak value)	
	Common value	Across the isolating distance	Common value	Across the isolating distance
(1)	(2)	(3)	(4)	(5)
3,6	10	12	20	23
			40	46
7,2	20	23	40	46
			60	70
12	28	32	60	70
			75	85
17,5	38	45	75	85
			95	110
24	50	60	95	110
			125	145
36	70	80	145	165
			170	195
52	95	110	250	290
72,5	140	160	325	375
100	150	175	380	440
	185	210	450	520
123	185	210	450	520
	230	265	550	630
145	230	265	550	630
	275	315	650	750
170	275	315	650	750
	325	375	750	860
245	360	415	850	950
	395	460	950	1 050
	460	530	1 050	1 200

Test voltage for the
following dielectric tests:-
Ref: IEC 62271-1

1. Power Frequency voltage
withstand test-1 min.
duration.

2. Lightning impulse
voltage withstand test.

**Minimum Electrical Clearance As
Per BS:162.**

Voltage in KV	Phase to earth in mm	Phase to phase in mm
0.415	15.8	19.05
0.600	19.05	19.05
3.3	50.8	50.8
6.6	63.5	88.9
11	76.2	127.0
15	101.6	165.1
22	139.7	241.3
33	222.25	355.6

Creepage Distance Selection- BS 162.

Table 2. Creepage distances to earth in air for open and enclosed busbars of indoor-type switchgear	
Rated voltage	Minimum creepage distance in air
kV	mm
3.6	50
7.2	90.0
12	125.0
17.5	150.0
24	200.0
36	300.0

Minimum Phase to Earth clearance Maintained Area



→ Minimum Clearance
maintained - 130mm

IN House Test



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REPORT NO: 280115-1

DATE: 28.01.15

CONTACT RESISTANCE MEASUREMENT TEST:

Testing Equipment: Contact resistance meter
Model: CRM 100B
Calibration due date: 11.01.2016

Make: Scope
Sl. No: 2301.02AA552

PHASE	ACROSS POLE TO POLE (Micro.Ohms)
R	60.9
Y	63.1
B	64.5

TIME INTERVAL TEST:

Using Equipment: Time Interval Meter
Model: SCOT MXP
Calibration due date: 11.01.2016

Make: Scope
Sl. no: 2101.05AA553

PHASE	OPERATION 1(110%)			OPERATION 2(100%)			OPERATION 3(85%)	OPERATION 4(70%)		
	CLOSE (ms)	TRIP (ms)	C-O (ms)	CLOSE (ms)	TRIP (ms)	C-O (ms)	CLOSE (ms)	TRIP (ms)	C-O (ms)	
R	039	032	014	040	034	015	042	042	014	
Y	037	032	014	038	034	015	040	042	016	
B	039	032	014	039	034	015	041	042	016	

HIGH VOLTAGE TEST:

Using Equipment: High Voltage Test Set
Type: B.D.T

Make: Automatic Electric
Sl. no: HVA 730

PHASE	High Voltage AC r.m.s(1 MIN)	
	Close 28KV AC r.m.s	Open 30KV AC r.m.s
R	28	30
Y	28	30
B	28	30

- Withstood in all values.



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BREAKER TEST REPORT

CLIENT: S & S POWER SWITCHGEAR LTD
SITE: MARAIMALAI NAGAR
MAKE: S & S
RATED VOLTAGE: 12KV
AMPS: 630A
TYPE: INDOOR VCB TRUCK
SI.NO: 001

INSULATION RESISTANCE VALUE TEST:

Using Equipment: Insulation Tester
Model: CIE/444
Calibration due date: 16.07.2015

Make: CIE
Testing Voltage: 5000V DC

BEFORE HIGH VOLTAGE TEST:

VCB Position : Close

R ph to Y ph	: >5000 M.ohm
Y ph to B ph	: >5000 M.ohm
B ph to R ph	: >5000 M.ohm
R ph to Earth	: >5000 M.ohm
Y ph to Earth	: >5000 M.ohm
B ph to Earth	: >5000 M.ohm

AFTER HIGH VOLTAGE TEST:

VCB Position : Close

R ph to Y ph	: 5000 M.ohm
Y ph to B ph	: >5000 M.ohm
B ph to R ph	: >5000 M.ohm
R ph to Earth	: >5000 M.ohm
Y ph to Earth	: >5000 M.ohm
B ph to Earth	: >5000 M.ohm

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REPORT NO: 280115-1

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REMARKS:

NIL

NOTE:

Values are satisfactory and Breaker fit for service.

TEST WITNESSED BY

DAE / GSO - Electrical

M/s. S&S Power Switchgear Ltd.

1.Mr.S.Saravanan, TO/C

1.Mr.R.Chandramouli, Engineer - Technical

2.Mr.P.N.Shanmugam, SA/E

2.Mr.B.Rajamanikandan, Senior Engineer

3.Mr.J.Sundarrajan, Senior Technician



JES SERVICE ENGINEER

V. Venkadeswaran

V.VENKADESWARAN

3

VALIDATION

- ▶ Lightning impulse voltage test.



LIGHTNING IMPULSE TEST



Department of Electrical Engineering
High Voltage Laboratory
Indian Institute of Technology Madras, Chennai- 600 036

TR / 07 / 14-15

Date: 05.02.2015

DRY POWER FREQUENCY AND IMPULSE VOLTAGE WITHSTAND TEST ON 12 kV, 630 A, THREE PHASE VACUUM CIRCUIT BREAKER

1.0 General Data :

Name of the manufacturer : M/s S & S POWER SWITCHGEAR Ltd.
Maraimalai Nagar – 603209.

Present during the test

On behalf of customer : Mr.N.Djeardjane / R.Nagarajan / P.N.Shanmugan, GSO

On behalf of manufacturer : Mr.R.Jayaraman / R.Chandramouli / B.Rajamanikandan

2.0 Technical Data:

Type of specimen : One no. Vacuum Circuit Breaker HHV12 ,three phase
as per drawing Nos.4BH910000 Rev A ,IGSK060 Rev 00
& 150-35260

Nominal ratings as per nameplate or
as submitted by the manufacturer. : Voltage Rating : 12 kV
Current Rating : 630A
Rated breaking current : 25kA
No. of phases : 3
Vacuum Interrupter type : WL-35260
Serial no. : 001

Test Conducted : Dry Power Frequency and Impulse Voltage withstand test

As per : IEC – 62271-100 & IEC-62271-1

Tested on : 13.01.2015

Phone: 044-2257 5424

Fax: 044 – 2257 4402

3.0 Test data:

3.1 Test Voltage

Lightning Impulse : 75 kV_{max} - Breaker Closed & Open position

Power Frequency Voltage : 28 kV(rms)

3.2 Test Conditions

: Test was conducted as per testing arrangement
shown in the attached drawing No.TR/07/14-15

Wave shape

: 1.2 / 50 μ s (within permissible tolerance)

Sl.No	Breaker Test Condition	Voltage applied to	Earth connected to
1	Closed	Aa	BCbcF
2	Open	A	BCabcF

3.3 Atmospheric conditions

Average room temperature : 27 °C
Average barometric pressure : 758 mm Hg
Average relative humidity : 70 %

3.4 Test procedure

After connecting the VCB in closed position , the 50 Hz A.C voltage was gradually raised from 0 to 28 kV_{max}, maintained for 1 min. duration and reduced to zero. The test was repeated by keeping VCB in open position.

After adjusting the impulse generator to deliver a standard impulse (1.2 / 50 μ s) of 75 kV_{peak}, fifteen full waves of both positive and negative polarities have been applied in sequence. The wave shapes of the applied voltages during the first and fifteenth applications have been recorded in all three phases as stated in 3.2 Test Conditions. Typical oscillographic recordings are appended.

4.0 Comments / Results:

Under the conditions detailed in section 3.0, the 12 kV, 630 A three phase Vacuum Circuit Breaker is considered to have withstood both the dry power frequency and impulse voltage withstand test .

Encl: Drawing No. TR/07/14-15
Typical oscillograms



R. Sarathi
(R.SARATHI)

Phone: 044-2257 5424

Fax: 044 – 2257 4402

Successfully Validated at IIT, Chennai, TAMILNADU

Conclusion and action

- ▶ First W.O effected with eleven 3Nos. Despached to IGCAR. (Kalpakkam)