Easun MR Tap Changers P Ltd
Unit II – TBN

Date: 17/06/2024

DRIVE MECHANISM AUTOMATED TEST

Time: _____am

Test order details observation

Inspection Lot No:	TEXT BOX	Work Order / Unit:	TEXT BOX	Rev. No:	TEXT BOX	Date:	TEXT BOX
Serial nr:	TEXT BOX	Phase Drawing:	TEXT BOX	Rev. No:	TEXT BOX	Date:	TEXT BOX
Customer:	TEXT BOX	Schematic diagram No:	TEXT BOX	Rev. No:	TEXT BOX	Date:	TEXT BOX
Description:	TEXT BOX	END USER	TEXT BOX				

Reports/Trackers @SAP from Production: □ Check List □ Trackers

Internal painting check list availability : □Yes □ No

Special Features if any: TEXT BOX

Observation on Visual / Aesthetic Requirements Checks-Manual Entry

Description	Requirement As per Work order sheet	Actual Observation
Serial No		TEXT BOX
Model of DM	MA-2 □ MA-9 □ MA-7 □ AMD □	
Verification of Name plate	1.Description 2. Motor voltage, 3. Control voltage, 4. Frequency, 5.Tr. Resistance Value 6.Year of mfg.	1. TEXT BOX 2 TEXT BOX 3. TEXT BOX 4. TEXT BOX 5. TEXT BOX 6. TEXT BOX
Schematic diagram No:		TEXT BOX
DM Paint Shade-External		TEXT BOX
DM Paint Shade-Internal		TEXT BOX
Paint Thickness		TEXT BOX
Paint Scratches/Finishing	No Scratches □	FS □

	Line Mark □ Painting Peel Off □ Paint Fade □	LS□ RS□ BS□ TS□ BS□
Power Voltage(motor)	380 AC /DC □ 415 AC /DC □ 400 AC /DC □ 430 AC /DC □	
Control voltage	110VAC/DC □ 230 VAC/DC □	
DM Material	MS □ SS □ Aluminum □	
DM Door Hinge	Left □ Right□	
No. of Push button Holes	3 □ 4 □ 5 □ 6 □ 7□ 8 □	
No. of ADS	TEXT BOX	
Type of TPI Resistance Qty:	1 K Ohms □ 100K Ohms □ 1 □ 2 □	
General /Standard Requirements:		

DM counter reading Minimum 500 endurance operation before start	□ Yes □ No
Hand crank provided inside the DM with paint shade matching	□ Yes □ No
Earth bride provided b/w DM & DOOR	□ Yes □ No
Availability of Scheme & Pouch	□ Yes □ No
Availability of Hand crank with Spring dowel	□ Yes □ No
Function of DOOR Lock with PAD	□ Yes □ No
Availability of top flange shaft “o” Ring, Guard, Pouch	□ Yes □ No
No any spillage of wire sleeve, copper strings and dust, yellow paint and any hand written Nos are words (only printed Label)	□ Yes □ No
Earth bolt provided on both directions	□ Yes □ No
Gland plate matching with uniform paint	□ Yes □ No
Terminal block transparent protection cover provided for Stud and nut Type	□ Yes □ No
Push button alignment	□ Yes □ No
window glass & gasket seated properly	□ Yes □ No

White spiral sleeves provided on all the wire bunches	□ Yes □ No

General /Stickers/Caution/Attention Requirements:	
IPX5 sticker with QC sign	□ Yes □ No
HV test availability	□ Yes □ No
DANGER STICKER As per the Motor Voltage	□ Yes □ No
Ensure the Shorting Link Provided as per the SHD	□ Yes □ No
Rotate the hand crank and check the Raise and Lower Direction symbol	□ Yes □ No
Phase sequence Attention sticker	□ Yes □ No
Proximity wiring shorting stickers	□ Yes □ No
Hand Revolution sticker	□ Yes □ No
CAM Switch stickers as per legend	□ Yes □ No
ADS wire stickers/Labels	□ Yes □ No
Electrical Limit switch stickers	□ Yes □ No
Mechanical Limit switch stickers	□ Yes □ No
Earthling sticker at both the sides near earth bolt	□ Yes □ No

Legend EBOM Requirements:

Description	Reference from Legend	Actual Observation with Label identification
Raise Contactor	Legend Siemens □ Schneider-**make** 415 V AC/DC □ 220 V AC/DC □ 110 V AC/DC- **Volatge** Legend Siemens □ Schneider-**make** 415 V AC/DC □ 220 V AC/DC □ 110 V AC/DC- **Volatge** Legend Siemens □ Schneider-**make** 415 V AC/DC □ 220 V AC/DC □ 110 V AC/DC- **Volatge**	
Lower contactor	Legend Siemens □ Schneider-**make** 415 V AC/DC □ 220 V AC/DC □ 110 V AC/DC- **Volatge**	

	Legend Siemens □ Schneider-**make** 415 V AC/DC □ 220 V AC/DC □ 110 V AC/DC- **Volatge** Legend Siemens □ Schneider-**make** 415 V AC/DC □ 220 V AC/DC □ 110 V AC/DC- **Volatge**	
Step by step contactor	Legend Siemens □ Schneider-**make** 415 V AC/DC □ 220 V AC/DC □ 110 V AC/DC- **Volatge** Legend Siemens □ Schneider-**make** 415 V AC/DC □ 220 V AC/DC □ 110 V AC/DC- **Volatge** Legend Siemens □ Schneider-**make** 415 V AC/DC □ 220 V AC/DC □ 110 V AC/DC- **Volatge** Legend Siemens □ Schneider-**make** 415 V AC/DC □ 220 V AC/DC □ 110 V AC/DC- **Volatge**	
Breaking contactor	Legend Siemens □ Schneider-**Make** 220 V AC/DC □ 110 V AC/DC-**Voltage**	
Additional contactor	AC-1 □ AC-II □ K6□K7□SHC1□ SHC2□ AC-5-**Type** or TEXT BOX	
Motor protective relay	Siemens□ Schneider-**Make** 1.6-2.4A□2.4-4A □ 4-6A □ 6-10 A-**Current Rating**	Set Value TEXT BOX
Shunt trip coil	Siemens□ Schneider-**Make** 220 V AC/DC □ 110 V AC/DC-**Voltage**	
TDR On / Off delay	EAPL □ Siemens□ Schneider-**Make** 1 No□ 2 No□- **Qty**	Set Value TEXT BOX
Heater switch	Kaycee - SX 112 □ SX 114A □ SX 114C □	

	Salzer – 61197-**Make**	
Local/Remote switch	Kaycee SX114A □ SX114C□SX126A □ SX1410A □ Salzer – 61039-**Make**	
Motor	Remi □BBL □Rotomac□Dharani□KEC -Make 0.5 HP □ 0.75 HP □ 1 HP □ 1.5HP **– Power** 380V AC □ 400V AC□415V AC 110V DC□ 220V DC **-Voltage**	Sl. No: TEXT BOX
Aux. supply Transformer	Ampitron □ Ashoka □Saraswathi□Quantum-**Make** **Primary Coil.-** 230V □ 380V□400V □ 415V □ 430V **Secondary coil**- 55-0-55V □ 110-0-110V □	Sl No: TEXT BOX
Heater	Pyros□Ashoka□RKH□Sai EGO -**Make** 230VAC □ 110V AC -**Voltage** 40W□80W□100W **-Wattage**	Sl. No: TEXT BOX
Thermostat	Sai EGO 230 VAC □ Sunvic230 VAC □ Grish EGO 230 VAC-**Make**	
Fuse/Link	Copper busman□ Siemens-**Make** Qty	
Terminal blocks-1	Elmex, Connect well-**Make** CAT-M3□ CAT-M4 □ CBT- M4 □ KLTDM4□ STH4□ CSTSB3 □ CSTSB4 □ CST 4UN-**Part No**.	TB 1 TEXT BOX No's
Terminal blocks-2	Elmex, Connect well-**Make** CAT-M3□ CAT-M4 □ CBT- M4 □ KLTDM4□ STH4□ CSTSB3 □ CSTSB4 □ CST 4UN-**Part No**.	TB 2 TEXT BOX No's
Terminal blocks-3	Elmex, Connect well-**Make** CAT-M3□ CAT-M4 □ CBT- M4 □ KLTDM4□ STH4□ CSTSB3 □ CSTSB4 □ CST 4UN-**Part No**.	TB 3 - TEXT BOX No's
Push button Raise/Lower	Yellow □ white□ Spring Return -**Type** Siemens□ Technic –Other- **Make**	
Trip Push button	Stay put □ Red □ Transparent Red-**Type**	

MCB 4 Pole	Siemens□ ABB□ Legrand□ **Schneider-Make** 32 A □ 16 A□ 10 A □ 6 A □ 4 A □ 2 A **– Current Rating**	
MCB 3 Pole	Siemens□ ABB□ Legrand□ **Schneider-Make** 32 A □ 16 A□ 10 A □ 6 A □ 4 A □ 2 A **– Current Rating**	
MCB 2 Pole	Siemens□ ABB□ Legrand□ **Schneider-Make** 32 A □ 16 A□ 10 A □ 6 A □ 4 A □ 2 A **– Current Rating**	
MCB 1 Pole	Siemens□ ABB□ Legrand□ **Schneider-Make** 32 A □ 16 A□ 10 A □ 6 A □ 4 A □ 2 A **– Current Rating**	
1ploe Add on block for MCB	Siemens□ ABB□ Legrand□ **Schneider-Make** 32 A □ 16 A□ 10 A □ 6 A □ 4 A □ 2 A **– Current Rating**	
TCSIS	Salzer 61197 □ Kaycee SX145 - **Make**	
Single Phase preventer	Minilec □ GIC (SM301 series)**-Make** Auxiliary Supply - 415V □ 230V AC **-Voltage** UV TEXT BOX OV TEXT BOX Timer TEXT BOX	
illumination Lamp	CFL □ LED-**Type** **Philips** □ **Bajaj**□ **Syska-Make** 4W □ 5W□ 9W □ 12W-**wattage**	
Trip Lamp/Signal Lamp	110V □ 230V AC -**Voltage**	
Plug & Socket	Anchor □ Legrand □-**Make** 5 A □ 15 A□-**Current Rating**	

Performance and Application test Requirements:			
1	Perform IR test before HV test and Note down the value	IR Test	
2	HV test conducted for 2KV withstood for 60seconds	HV TEST	□ Yes □ No
3	Perform IR test after HV test and Note down the value	IR Test	
4.	Insert hand crank and check the manual revolution on both direction two taps-33Rev	Revolution	□ Yes □ No
5	Ensure Control and power voltage as per the schematic diagram	Voltage	□ Yes □ No
6	Insert the Hand crank in S8 or B8 switch give pulse via S1 or S2 Raise or Lower -	HC safety switch	□ Yes □ No

	Motor should not Run		
7	Check the center position of tap no of Position indicator wheel w.r.t Tap no in TPI from end to end position.	TPI	□ Yes □ No
8	Run the DM at Local manual mode for one complete cycle and check the tap no with TPI meter.	TPI	□ Yes □ No
9	Perform the test- Single pulse Via Push button Raise or Lower Motor should run in any one position i.e.: Raise means raise direction, Lower means Lower direction.	Pulse	□ Yes □ No
10	Continuous Pulse Via push button Raise or Lower /Multiple Pulse Via push button Raise or Lower -In all the condition Motor should run in any one position i.e.: Raise means raise direction, Lower means Lower direction.	Pulse	□ Yes □ No
11	Press and hold the Push button either raise or Lower motor should operate and stop, no continuous operation occurrence should happen.	Pulse	□ Yes □ No
12	Perform Phase sequence test -Change the Motor Phase sequence and activate the Raise or Lower Motor will start up & MPR will tripped @ 3 to 4 division. Then change the phase sequence as per initial	Phase sequence	□ Yes □ No
13	Perform the test- Single pulse Via Raise or Lower Trip the LEPB(MPR) manually during the operations Give continuous pulse (S1) in opposite direction Release MPR-In this condition motor must complete execution of an interrupted switching operation on the same direction	Counter pulse	□ Yes □ No
14	Perform the test - Pulse to Lower End tap »»□Pulse to Lower push button switch, Motor and contactor should not pick up and energized. This confirms the electrical Limit at Lower direction.	Electrical Limit-Lower	□ Yes □ No
15	Perform the test - Use Hand crank rotate in Lower direction up to Mechanical Limit end stopper, and remove the hand crank No contactor should energize.	Mechanical End Limit	□ Yes □ No
16	Perform the test- Pulse to Raise End tap -Pulse to Raise push button switch, Motor and contactor should not pick up and energized. This confirms the electrical Limit at Raise direction.	Electrical Limit-Raise	□ Yes □ No
17	Perform the test- Use Hand crank rotate in Raise direction up to Mechanical Limit end stopper, and remove the hand crank No contactor should energize.	Mechanical End Limit	□ Yes □ No
18	Pulse the motor and trip (MPR) emergency push button 5 times and reset, No any abnormalities should occurs.	MPR	□ Yes □ No
19	Check all the TB ferrules to be matching with schematic TB List	TBs check	□ Yes □ No

20	All the Lugs should be uniformly crimped with same color code Except 1.5 Sq.mm wire	TBs check	□ Yes □ No
21	Check the functionality of DOOR Limit Switch by closing the door	Door switch	□ Yes □ No
22	Mechanical end limit revolution	Raise	Lower

CAM Sequence test Requirements:

Raise Directions-CAM Sequence-Before end tap

Switch	Switch Red DIV status	Switch Sequence Status	Activated Division	Acceptance criteria
S14 (3-3.5)	Close-C-NC	Open-C-NC	TEXT BOX	Diff b/w S14 and S13 more than 0.25Div
S13 (3.5-4)	Close-C-NC	Open-C-NC	TEXT BOX	
S6-Control (28-30)	Close-C- NC	Open-C-NC	TEXT BOX	
S14 (31.5-32)		Close-C-NC	TEXT BOX	
S13 (31.5-32)		Close-C-NC	TEXT BOX	Diff b/w S13 & S6-Power more than 0.25div
S6-Power (33-33.5)	Close-C- NC	Open-C-NC	TEXT BOX	

Lower Directions-CAM Sequence-Before end tap (2 to 1)				
Switch	**Switch Red DIV status**	**Switch Sequence Status**	**Activated Division**	**Acceptance criteria**
S12 (3-3.5)	Close-C-NC	Open-C-NC	TEXT BOX	Diff b/w **S12 & S13** more than 0.25Div
S13 (3.5-4)	Close-C-NC	Open-C-NC	TEXT BOX	
S7-Control (28-30)	Close-C- NC	Open-C-NC	TEXT BOX	
S12 (31.5-32)		Close-C-NC	TEXT BOX	
S13		Close-C-NC	TEXT BOX	Diff b/w **S13 & S7**-Power more than 0.25div
S7-Power (33-33.5)	Close-C- NC	Open-C-NC	TEXT BOX	

Application test Requirements				
1	Perform Under voltage test for one complete cycle	UV	TEXT BOX	V
2	Perform Over voltage test for one complete cycle	OV	TEXT BOX	V
3	Perform Normal voltage test for 8 complete cycle of operation	NV	TEXT BOX	V

OLTC DRIVE MECHANISM AUTOMATED TEST

Serial Number	A12345
Test Type	Variant 1-5-9
Number of Cycles	12
Under Voltage Cycles	1
Nominal Voltage Cycles	8
High Voltage Cycles	8
Maximum Tap Position	17
Number of Tap Position Indicators	1
No. Upper Limit Reached Input	1
No. Lower Limit Reached Input	1
No. Tap change delay/Struck up Indication	1
No. Tap Change in progress indications	1

OLTC DRIVE MECHANISM AUTOMATED TEST

Serial Number:	A12345
Test Type:	Variant 1-5-9
Test Voltage:	Nominal
Cycle No:	1
Maximum Tap: Positions	17

Test Status: OFF

START Pause Restart

12

CURRENT TAP POSITION

- ◯ 1. Upper Limit Reached indication 1
- ◯ 2. Upper Limit Reached indication 2
- ◯ 3. Lower Limit Reached indication 1
- ◯ 4. Lower Limit Reached indication 2
- ◯ 5. MPR Trip Indication 1
- ◯ 6. MPR Trip Indication 2
- ◯ 7. Tap change in progress indications 1
- ◯ 8. Tap change in progress indications 2
- ◯ 9. Tap change delay/struck up 1
- ◯ 10. Tap change delay/struck up 1
- ◯ 11. Local indication
- ◯ 12. Remote indication
- ◯ 13. ODD indication
- ◯ 14. EVEN indication
- ◯ 15. SPP Potential free Indication
- ◯ 16. Control supply healthy indication
- ◯ 17. Control supply Unhealthy indication
- ◯ 18. Power supply 415V Healthy condition
- ◯ 19. Power supply 415V Unhealthy
- ◯ 20. AC Supply Fail
- ◯ 21. ILC (Interlocking) circuit indications
- ◯ 22. Proximity switch healthy indications
- ◯ 23. Tap changer healthy monitoring
- ◯ 24. TDR Potential free

Actual Tap Position Number	Tap Position Reading in Indicator 1	Tap Position Reading in Indicator 2	Odd/Even Indications Sequence	TPI 4-20mA Output 1	TPI 4-20mA Output 2	CCU 4 TO 20mA Output Value
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						

16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						

CAM Switch timing sequence measurement

FAC as follows For LOWER-Check through Oscilloscope

SL.No	Description	FAC	Observed Value
1	O_{MD}-C_{S12}	620 to 775ms	
2	O_{MD}-C_{S13}	656 to 853ms	
3	O_{MD}_C_{LLS}	4.5 to 5.0 sec	
4	O_{MD}-O_{S12}	5.1 to 5.3 sec	
5	C_{S12}_C_{S13}	36 to 78ms	
6	O_{S12}_O_{S13}	Min 10ms	

FAC as follows For RAISE-Check through Oscilloscope

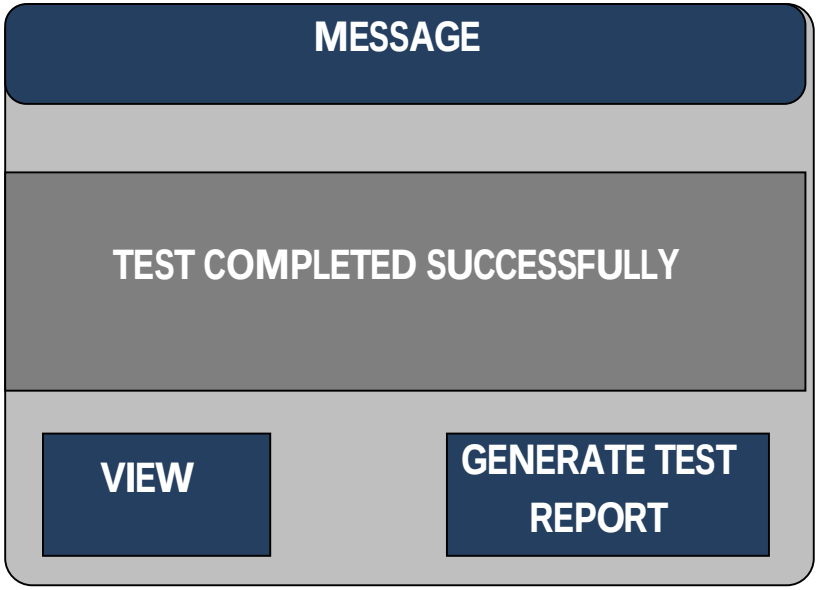
SL.No	Description	FAC	Observed Value
1	O_{MD}_C_{S14}	620 to 775ms	
2	O_{MD}_C_{S13}	656 to 853ms	
3	O_{MD}_C_{RLS}(Control)	4.5 to 5.0 sec	
4	O_{MD}_O_{S14}	5.1 to 5.3 sec	
5	C_{S14}_C_{S13}	36 to 78ms	
6	O_{S14}_O_{S13}	Min 10ms	

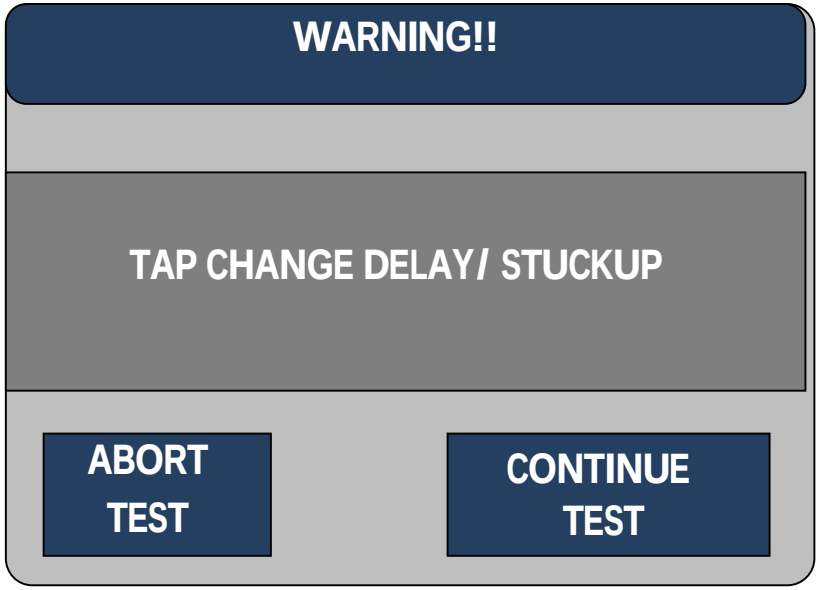
Potential Free Indication test Requirements:		
1	Upper Limit Reached indication	□ Yes □ No □ NA
2	Upper Limit Reached indication	□ Yes □ No □ NA
3	Lower Limit Reached indication	□ Yes □ No □ NA
4	Lower Limit Reached indication	□ Yes □ No □ NA
5	MPR Trip Indication	□ Yes □ No □ NA
6	MPR Trip Indication	□ Yes □ No □ NA
7	Tap change in progress indications	□ Yes □ No □ NA
8	Tap change in progress indications	□ Yes □ No □ NA
9	Tap change delay/struck up indication	□ Yes □ No □ NA
10	Tap change delay/struck up indication	□ Yes □ No □ NA
11	Local indication	□ Yes □ No □ NA
12	Remote indication	□ Yes □ No □ NA
13	ODD indication	□ Yes □ No □ NA
14	Even indication	□ Yes □ No □ NA
15	SPP Potential free Indication	□ Yes □ No □ NA
16	Control supply healthy indication	□ Yes □ No □ NA
17	Control supply Unhealthy indications	□ Yes □ No □ NA
18	Power supply 415V Healthy condition	□ Yes □ No □ NA
19	Power supply 415V Unhealthy condition	□ Yes □ No □ NA
20	AC Supply Fail	□ Yes □ No □ NA
21	ILC (Interlocking)circuit indications	□ Yes □ No □ NA
22	Proximity switch healthy indications	□ Yes □ No □ NA
23	Tap changer healthy monitoring indications	□ Yes □ No □ NA
24	Hand crank potential free indications	□ Yes □ No □ NA
25	TDR Potential free	□ Yes □ No □ NA

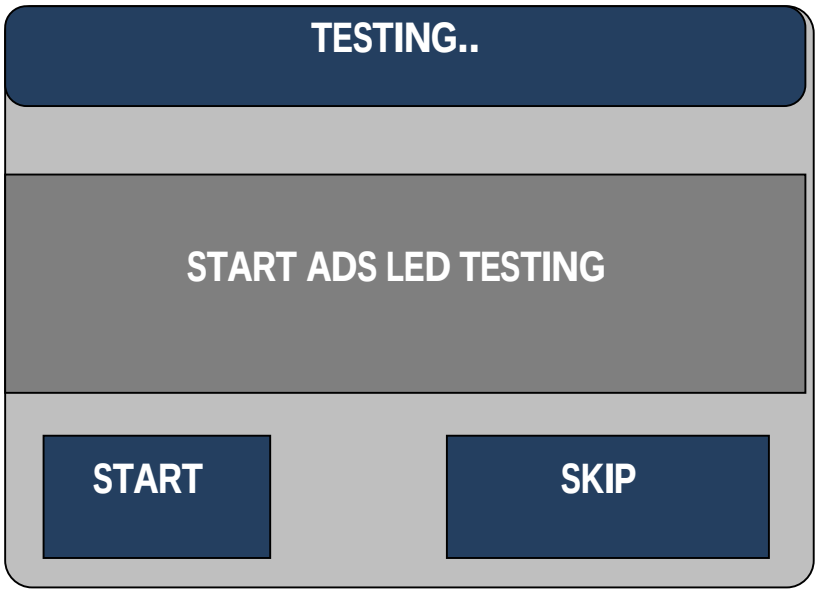
Start recording of ADS potential free indication checks-Potential Free																		
Actual tap	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
LED Indication	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	
Actual tap	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
LED Indication	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑

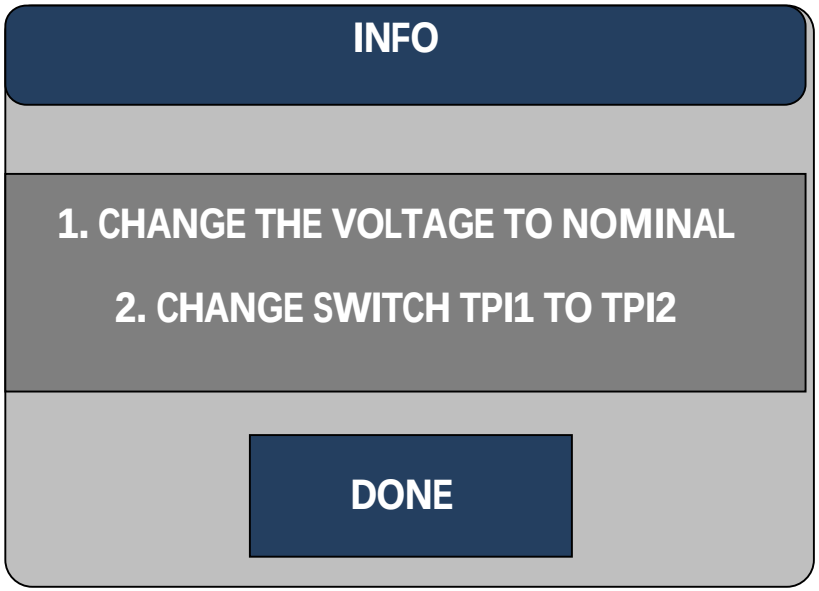
1	De energize all the circuits and remove the wire and re tight all the TBs		□ **Yes** □ **No**
2	Provide transparent cover on TBs		□ **Yes** □ **No**

Popup


MESSAGE
TEST COMPLETED SUCCESSFULLY
VIEW
GENERATE TEST REPORT


WARNING!!
TAP CHANGE DELAY/ STUCKUP
ABORT TEST
CONTINUE TEST


TESTING..
START ADS LED TESTING
START
SKIP


INFO
1. CHANGE THE VOLTAGE TO NOMINAL
2. CHANGE SWITCH TPI1 TO TPI2
DONE

Drop Down List

1. Variant 1-5-9
2. Variant 1-9b- 17
3. Variant 1-9- 17
4. Variant 1-11b- 21
5. Variant 1-14b- 27
6. Variant 1-17b- 35