BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

MANUFACTURING QUALITY PLAN -- PVC CONTROL CABLE

List of component manufacturer

Manufacturer :
MQP No : 030
Item : Control, Relay & SAS Panel
CRCA Sheet

BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

MANUFACTURING QUALITY PLAN -- PVC CONTROL CABLE

M.Q.P. No.- 030

List of component manufacturer

			Control and Relay Panel	**Rev. No.** **00**	**Valid Upto:**	**13.12.2017**
				Date: **05.01.2016**		

Sr. No	CRCA Sheet	**Quantum of Check / Sampling with basis**	**Reference document for Testing**	**Acceptance Norms**	**Format of Record**	**Applicable Codes**						**Remarks**
						1	**2**	**3**	**4**	**5**	**6**	

Code 1	Indicates place **where testing is planned** to be performed i.e. Inspection location	**Code 2**	Indicates **who has to perform the tests** i.e. Testing Agency
A	At Equipment Manufacturer's works	J	The Equipment Manufacturer
B	At Component Manufacturer's works	K	The Component Manufacturer
C	At Authorised Distributor's place	L	The Third Party
D	At Independent Lab	M	The Turnkey Contractor
E	At Turn Key Contractor's location		
F	Not specified		
Code 3	Indicates **who shall witness** the tests i.e. Witnessing Agency	**Code 4**	Review of Test Reports/Certificates
P	Component Manufacturer itself	W	By Equipment manufacturer
Q	Component Manufacturer and Equipment Manufacturer	X	By Contractor during product/process inspection
R	Component Manufacturer, Equipment Manufacturer and Contractor	Y	By BSPTCL during product/process inspection
S	Equipment Manufacturer itself	Z	By Contractor and/or BSPTCL during product/process inspection
T	Equipment Manufacturer and Contractor		
U	Equipment Manufacturer, Contractor and BSPTCL		
V	Third Party itself		
Code 5	Whether specific approval of sub-vendor / Component make is envisaged?	**Code 6**	Whether test records required to be submitted after final inspection for issuance of Dispatch Clearance/ Instructions
E	Envisaged	Y	Yes
N	Not Envisaged	N	No

Notes:

1. The MQP should be read in conjunction with BSPTCL specification and shall deem to include additional tests if any required as per the contract.

2. BSPTCL specification shall include provisions of letter of Award , BSPTCL approved drawings /technical data sheet / BOM / test schedule / test procedure applicable to the specific contract.

3. In case of any contradiction between the manufacturer's plant standards , this MQP and BSPTCL specification following precedence shall be followed :-

a) BSPTCL specification .
b) This Manufacturing Quality plan .
c) Manufacturer's plant standards .

BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

MANUFACTURING QUALITY PLAN -- PVC CONTROL CABLE

M.Q.P. No.- 030

List of component manufacturer

				Control,Relay Panel & Substation Automation System	Rev. No. 00			Valid Upto:				Till Revision	
					Date:	05.01.2016							
Sr. No	CRCA Sheet	Quantum of Check / Sampling with basis	Reference document for Testing	Acceptance Norms	Format of Record	Applicable Codes						Remarks	
						1	2	3	4	5	6		
A.	**RAW MATERIAL INSPECTION**												
A-1	**Enclosures (Panel, Trolley, Kiosk)**												
1	**Sheet steel CRCA**									E			
1.1	Dimension conformity including thickness	minimum of 1 sheet of each size per lot.	EM Standards / BSPTCL Tender Specifications	EM Standards / BSPTCL Tender Specifications	CM - TC/Third party lab report	B	K	P	W/Z		N	Manufacturer test certificate to match as per IS 513 . Chemical and mechanical analysis by Third party lab once in six month and reviewed by EM	
1.2	Surface finish	100%											
1.3	Mechanical Test	1 sample / lot.											
1.4	Chemical composition(Grade D/DD as per IS 513)	1 sample/lot											
2	**Fabrication**									E			
2.1	Dimensional conformity, bend angle, profile, deburring & slag removal.	As per AQL 2.5	EM Standards / BSPTCL Tender Specifications	EM Standards / BSPTCL Tender Specifications	CM - TC	B	K	P	W		N		
3	**Surface preparation / Pretreatment.(7 Tank Process)**									E			
3.1	Hot Degreasing, derusting/ / pickling, Hot phosphating, , rinsing with water after each process or equivalent	100%	EM Standards / BSPTCL Tender Specifications	EM Standards / BSPTCL Tender Specifications	CM - TC	B	K	P	W		N		
3.2	Weight of Phosphate Coating	1Sample/lot	EM Standards / BSPTCL Tender Specifications	EM Standards / BSPTCL Tender Specifications	CM -TC	D	L	V	W / Z	E	N	Test to be done once in an year, at 3rd party lab and TC to be reviewed by EM	
4	**Powder coating and baking.**									E			
4.1	Surface finish/ shade/ adhesion/ scratch hatch test.	Randomly selected places	EM Standards / BSPTCL Tender Specifications	EM Standards / BSPTCL Tender Specifications	CM - TC	B	K	Q	W		N	Record Review on surveillance basis by BSPTCL	
4.2	Coating thickness	Random	EM Standards / BSPTCL Tender Specifications	EM Standards / BSPTCL Tender Specifications									
5	**CUBICLE COMPONENTS**												
5.1	**EARTH BUS BAR** Dimensional conformity Hardness & surface defects	One sample per lot	EM Standards / BSPTCL Tender Specifications	EM Standards / BSPTCL Tender Specifications	CM's - TC	B	K	P	W	N	N		
5.2	**FASTENERS-(**Bolts/Nuts/Washers) - Dimensional Conformity - Surface Finish	As per AQL 2.5	EM Standards / BSPTCL Tender Specifications	EM Standards / BSPTCL Tender Specifications	QC-Record	B	K	P	W	N	N		

BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

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M.Q.P. No.- 030

List of component manufacturer

				Control,Relay Panel & Substation Automation System	**Rev. No.** 00			**Valid Upto:**				**Till Revision**	
					Date:	**05.01.2016**							
Sr. No	CRCA Sheet	**Quantum of Check / Sampling with basis**	**Reference document for Testing**	**Acceptance Norms**	**Format of Record**	**Applicable Codes**						**Remarks**	
						1	**2**	**3**	**4**	5	**6**		
5.3	**ASSEMBLED PANEL WITH ASSOCIATED COMPONENTS** (Door Switch, Space Heater, Thermostats, 3 Pin Socket And Switch, Mimic Strip, Fluorescent/ Incandescent Lamp) Position of component assembly Type & Quantity of components assembled Quality of assembly	As per AQL 2.5 for Functional Test), Visual 100%	EM Standards / BSPTCL Tender Specifications	EM Standards / BSPTCL Tender Specifications	CM-TC	B	K	Q	W	E	N		
5.4	**GASKET (EPDM/Neoprene/PU)** Dimensional conformity, compressibility , Shore hardness,tensile and elongnation test	One sample per lot	EM Standards / BSPTCL Tender Specifications	EM Standards / BSPTCL Tender Specifications	CM- TC	B	K	P	W/Z	E	N	Type test report shall be verified for accelarated age test	
5.5	**OTHER COMPONENTS** (Bought out items) MCBs, ,Aux relays, Semaphore indicators, Indicating Lamp, Fuses, Selector Switches / Control Switches,Lugs, terminal Blocks and Push buttons, Hooters / Bells / Buzzers, Test Blocks	As per AQL2.5	EM Standards / BSPTCL Tender Specifications	EM Standards / BSPTCL Tender Specifications	CM-TC	B	K	P	W	E	N		
5.6	Electrical hardware like Ferrules, saddies, wire strips, PVC Channel, clips, Designation labels, studs, combiflx sockets, pins, Test switches, Relays bases, short ckt tools, Extractor tools, Branch connectors etc.	As per AQL2.5	EM Standards / BSPTCL Tender Specifications	EM Standards / BSPTCL Tender Specifications		B	K	P	W	N	N		
6	**PVC/FRLS INSULATED WIRES (ISI Marked)**												

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List of component manufacturer

				Control,Relay Panel & Substation Automation System	**Rev. No.** 00			**Valid Upto:**			**Till Revision**		
					Date:	**05.01.2016**							
Sr. No	CRCA Sheet	**Quantum of Check / Sampling with basis**	**Reference document for Testing**	**Acceptance Norms**	**Format of Record**	**Applicable Codes**						**Remarks**
						1	**2**	**3**	**4**	5	**6**	
6.1	Conductor Resistance, Strands/ Color, Elongation, Type of cable, Material, Shielding (if called), Construction Diameter	As per IS 694	EM Standards / BSPTCL Tender Specifications	EM Standards / BSPTCL Tender Specifications	CM 's- TC	B	K	P	W/Z	E	N	Record Review on surveillance basis by BSPTCL
6.2	High voltage Spark test (during mnfg process)	100%										
6.3	Check for thickness of insulation & Overall Dimension, Insulation, Tensile strength, Elongation at Break test, Shrinkage Test, Heat Shock Test, Hot Deformation Test, Loss of Mass Test, Thermal Aging Test in Air	1 coil/Type/ As per IS 694 / IS 5831										
6.4	Flammability (As applicable) & High Voltage test (water immersion test)	Random										Flammability test to be done once in 6 months. Sample test in external lab by EM
7	**MEASURING INSTRUMENTS (Analog/Digital),** (Voltmeter, Ammeter, Wattmeter, VAR meter, Frequency Meter, Synchroscope, Strip Chart Recorders, Energy Meters)				CM 's- TC	B	K	P	W/Z	**E**	N	EM shall conduct all tests on meters and transducers assembly after panel assembly
7.1	Visual Inspection for, Type, Range, Movement type, Angle of indication, Graduation Marking	100%	EM Standards / BSPTCL Tender Specifications	EM Standards / BSPTCL Tender Specifications								Equipment manufacture shall conduct test and verify the CMTC
7.2	Operational check - For accuracy	100%	EM Standards / BSPTCL Tender Specifications	EM Standards / BSPTCL Tender Specifications								
7.3	H.V. Test: 2 kV for 1 min. in Panel assembly											
8	**TRANSDUCER** Operational test, Visual, Dimensions check, HV Test - 2 kV for 1min in panel assembly	100%	EM Standards / BSPTCL Tender Specifications	EM Standards / BSPTCL Tender Specifications	CM's - TC	B	K	P	W/Z	**E**	N	
9	**CURRENT/ VOLTAGE TRANSFORMER**									**E**		
9.1	Name plate, CT/PT Ratio, Rated burden, accuracy Class, Termination, Mounting accessories	100%	EM Standards / BSPTCL Tender Specifications	EM Standards / BSPTCL Tender Specifications	CM's - TC	B	K	P	W		N	Record Review on surveillance basis by BSPTCL

BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

MANUFACTURING QUALITY PLAN -- PVC CONTROL CABLE

M.Q.P. No.- 030

List of component manufacturer

Sl. No.	Item(s)		Location
1	Fabrication		1.Bangalore 2.Bangalore 3.Bangalore
2	Powder Coating (Painting)		1.Bangalore 2.Bangalore 3.Bangalore
3	CRCA Sheet		1.Jamshedpur. 2.Khapoli. 3.Thane. 4.Dolvi
4	Panel wiring		1.Bangalore 2.Bangalore
5	Cables		1.Bangalore. 2.New Delhi 3.Pune 4.Bangalore 5.Mysore
6	Gasket		Gazraula
7	Terminal Blocks		1.Vadodara 2.Mumbai 3. Delhi 4.Mumbai
8	Transducers		1.Lonavala 2. Mumbai 3. USA 4.Mumbai
9	Indicating Instruments		1.Nashik 2.Mumbai 3.Mumbai
10	Auxiliary C.T's/P.T's		1.Baroda 2.Bangalore 3.Bangalore
11	Bay Control Unit		1.Sweden /Finland/ Switzerland / India 2. Germany 3. Chennai
12	Numerical Relays		1.Sweden /Finland/ Switzerland / India 2. Germany 3. Chennai 4.Germany
13	Non Numerical Relays		1.Bangalore 2.Chennai 3.Cochin 4.Hosur / Bangalore
14	Push Button with elements		1.Mumbai 2.Mumbai 3.Mumbai 4.Sweden / China
15	Selector Switches		1.Mumbai 2.Mumbai 3.Nashik 4.Finland/Sweden 5.Singapore
16	Control Switches		1.Chennai 2.Mumbai 3.Mumbai 4.Nasik 5.Germany/ Finland
17	Test Terminal Block		1.Vadodara 2.Mumbai 3.Mumbai 4.Mumbai

18	Fuse Fittings and Fuse Links		1.Hosur 2.Chennai 3.Pondychreey 4.Bangalore
19	Combiflex Tool Kit		Bangalore
20	Synchronising Socket		1.Faridabad 2.Chennai
21	Indicating Lamps		1.Sweden / China / India 2.Mumbai 3.Hosur 4.Chennai
22	Semaphore Indicators		1.Mumbai 2.Bangalore
23	AC / DC MCB's		1.Bangalore 2.Noida
24	Aux. Relays.		1.Bangalore & Vadodara
25	Aux. Relay Assy & Calibration		1.Bangalore 2.Bangalore
26	Annunciator		1.Mumbai 2.Mumbai
27	Energy Meters		1.Udyapur 2.Mysore
28	Event logger		1.UK/USA/Northern Ireland 2.UK/USA/Chennai
29	Disturbance Recorder		1.Finland /Switzerland/ Sweden 2.UK/France/Chennai 3.Germany 4 Northern Ireland
30	Time Synchronisation Equipment		1.UK/USA/Northern Ireland 2.Germany
31	PC based Relay Test Kit		1.USA / Australia 2.USA
32	PC		1.Malyasia /INDIA 2.Singapore /INDIA 3.Singapore/INDIA
33	LAPTOP		1.Malyasia /INDIA 2.Singapore /INDIA 3.Singapore/INDIA
34	Buzzer/Hooter/ Bell		1.Mumbai
35	Thermostats		1.Bangalore 2.Bangalore
36	Space Heater		1.Bangalore 2.Bangalore
37	Timer / Counter		1.Bangalore

Note: Manufacturer can also procure item from BSPTCL approved sources not mentioned in above list
All Envisaged items should be procured from BSPTCL approved sources only.

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M.Q.P. No.- 030

List of component manufacturer

Sl.No.	Component/Operation&Description of Test
1	Sampling Plan
2	KNOT Test
3	CRCA Sheet
4	ESD/Humidity Recommendation for IED Assembly
5	ESD requirementfor IED assembly
6	Bare PCB
7	Restricted Earth Fault relay
8	Local Breaker Backup relay
9	RET
10	RADHA-Differential Relay
11	REL
12	Auto Recloser Relay
13	Voltage/Current Relay
14	TSR
15	Over Exitation Relay
16	Frequency Relay
17	REG
18	Direction/Non Directional Current relay
19	Checklist for C&R,SAS Panel
20	Fabrication/surface preparation/pre treatment
21	CRCA Sheet
22	EARTH BAR
23	Assembled Panel with Associated components
24	POWDER COATING
25	Gasket
26	Fabrication/Hardware
27	Packing Check List
28	Rotary and Cam Switches
29	Lamp And Lamp holders,Tube And Tube Fitting
30	Terminal Blocks
31	Fuse Switch/Load Switch
32	Fuse/Fuse links
33	Push Bottons
34	PVC Cables
35	Current / Voltage Transformers
36	Indicating Instruments(Meters)
37	Buzzer/Hooter/Bell
38	Selectors/ Control Swicth

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M.Q.P. No.- 030

List of component manufacturer

		1	Fuse Failure Relay (FFR)Contacts: 2NO(RX	JV Enterprises
		2	Fuse Failure Relay (FFR)-RX type	JV Enterprises
		3	RXKF1, Range : 0.8-1.2s, Aux. -24-36v	SNS Ind.
	CRCA Sheet		RELAY RXKF1,0.8-1.2s,-48-60v,	SNS Ind.
		5	RXKF1: 0.8-1.2s,-110-125v	SNS Ind.
		6	TIME DELAY RELAY-RXKF1	SNS Ind.
		7	RXKF1, 0.2-3s,-24-36v	SNS Ind.
		8	RXKF1,0.2-3s,-110-125V DC,Timer	SNS Ind.
		9	RXKF1, 1s 220-250v	SNS Ind.
		10	RXKF1, 20-300S, Aux. -24-36v	SNS Ind.
		11	RXKF1,20-300s,-110-125v	SNS Ind.
		12	RXKL1 TIMER RELAY	IN HOUSE
		13	LED UNIT,2 RED,110V DC	SNS Ind.
		14	LED UNIT,1 RED+1 GRN,-110V DC,	SNS Ind.
		15	LED Unit ,2 RED, 220V DC	SNS Ind.
		16	LED Unit,1 RED+1 GREEN,220V DC	SNS Ind.
		17	TSR - 48VDC	SNS Ind.
		18	TSR - 125 VDC Relay	SNS Ind.
		19	TSR 24V DC MAKE:EM	SNS Ind.
		20	TSR - 110/220V DC	SNS Ind.
		21	RXSF1 24VDCMAKE:EM	JVE+ SNS Ind.
		22	RELAY RXSF1MAKE:EM	JVE+ SNS Ind.
		23	RXSF1 - 110-125V	JVE+ SNS Ind.
		24	RXSF1(1NO+2NC)	JVE+ SNS Ind.
		25	TSR - 110/220V DC	SNS Ind.
		26	TSR 250V	SNS Ind.
		27	OMHB-3-9, 45 sq.mm, 125VDC	SNS Ind.
		28	SWITCH OMHB= 3-11;RATED V=110V DC/45MM	SNS Ind.
		29	OMHB TYPE 3-4,220V,58mm KNOB	SNS Ind.
		30	OMHB,3-6,58mm KNOB,220V DC	SNS Ind.
		31	OMHB 3-9 58mm	SNS Ind.
		32	Type:OMHB 3-11, knob:58mm,220V DC	SNS Ind.
		33	SWITCH OMHB= 3-4,RATED V=110V DC	SNS Ind.
		34	OMHB-3-9, 58 sq.mm, 125VDC	SNS Ind.
		35	Type:OMHB 3-11, knob:58mm,110V DC	SNS Ind.
		36	SWITCH OMHB TYPE 3-4,220V,45mm	SNS Ind.
		37	OMHB3-11,48V DC,58mm knob size	SNS Ind.
		38	OMHB3-11,48V DC,45mm knob size	SNS Ind.
		39	OMHB 3-6 220V 45 MM KNOB	SNS Ind.
		163	RXMH2 - 220VAC - 4NO+4NC	IN HOUSE
		164	RXMVB2-24V DC -50-60Hz -110-127V-4NO+4NC	IN HOUSE +JVE
		165	RXMVB2 -48V DC- 50-60Hz -4NO+4NC	IN HOUSE +JVE
		166	RXMVB2-110V DC-50-60Hz -380V - 4NO+4NC	IN HOUSE +JVE
		167	RXMVB2 - 125V DC - 4 NO+4 NC	IN HOUSE +JVE
		168	RXMVB2 - 220V DC - 4 NO+4 NC	IN HOUSE +JVE
		169	RXMVB2 - 250V	IN HOUSE +JVE
		170	RXMVB2 -24V DC-50-60Hz -110-127V-2NO+4NC	IN HOUSE +JVE
		171	RXMVB2 -48V DC - 50-60Hz -220V - 2NO+6NC	IN HOUSE +JVE
		172	RXMVB2-110V DC-50-60Hz -380V -2NO+4NC	IN HOUSE +JVE
		173	RXMVB2 - 220V DC - 2 NO+4 NC	IN HOUSE +JVE
		174	RXMVB2 - 250V DC - 2 NO+4 NC	IN HOUSE +JVE
		175	RXMVB2-24V DC-50-60Hz -110-127V -5NO+3NC	IN HOUSE +JVE

	176	RXMVB2 -48V DC-50-60Hz -220V - 5NO+3NC	IN HOUSE +JVE
	177	RXMVB2 -110V DC-50-60Hz - 380V -5NO+3NC	IN HOUSE +JVE
	178	RXMVB2 - 220V DC - 5 NO+3 NC	IN HOUSE +JVE
	179	RXMVB2 - 250V DC - 5 NO+3 NC	IN HOUSE +JVE
	180	RXMVB4-24V DC-50-60Hz -110-127V -7NO+7NC	JV Enterprises
	181	RXMVB4 -48-55V DC-50-60Hz -220V -7NO+7NC	JV Enterprises
	182	RXMVB4 -110V DC -50-60Hz - 380V -7NO+7NC	JV Enterprises
	183	RXMVB4 - 220V DC - 7 NO+7 NC	JV Enterprises
	184	RXMVB4-24V DC-50-60Hz -110-127V -9NO+5NC	JV Enterprises
	185	RXMVB4 -48-55V DC-50-60Hz -220V -9NO+5NC	JV Enterprises
	186	RXMVB4 -110V DC-50-60Hz -380V -9NO+5NC	JV Enterprises
	187	RXMVB4 -125V DC - 9 NO+5 NC	JV Enterprises
	188	RXMVB4 - 220V DC - 9 NO+5 NC	JV Enterprises
	189	RXMVB4-24V DC-50-60Hz-110-127V -11NO+3NC	JV Enterprises
	190	RXMVB4-48-55V DC-50-60Hz -220V -11NO+3NC	JV Enterprises
	191	RXMVB4 -Relay DC- 110V -11NO+3NC	JV Enterprises
	192	RXMVB4 - 220V DC - 11 NO+3 NC	JV Enterprises
	193	RXMVB4 - 250V DC - 11 NO+3 NC	JV Enterprises
	194	RXSF1 - 24V DC, 4 NO+2 NC, RED FLAG	JVE+ SNS Ind.
	195	RXSF1(4 NO+2 NC)	JVE+ SNS Ind.
	196	RXSF1 - 110-125V DC, 4 NO+2 NC, RED FLAG	JVE+ SNS Ind.
	197	RXSF1 - 220-250V DC, 4 NO+2 NC, RED FLAG	JVE+ SNS Ind.
	198	RXSF1(4NO+2NC)	JVE+ SNS Ind.
	199	RXSF1(4NO+2NC)	JVE+ SNS Ind.
	200	RXSF1(4NO+2NC)	JVE+ SNS Ind.
	201	RXSF1	JVE+ SNS Ind.
	202	RXSF1	JVE+ SNS Ind.
	203	RXSF1(2 NO+4 NC)	JVE+ SNS Ind.
	204	Make: EM, type RXSF1 60V DC	JVE+ SNS Ind.
	205	RXSF1(1NO+2NC)	JVE+ SNS Ind.
	206	RXSF1(2NO+4NC)	JVE+ SNS Ind.
	207	RELAY RXSF1	JVE+ SNS Ind.
	208	RXSF1 - 48-55V DC, 2 NO+1 NC, RED FLAG	JVE+ SNS Ind.
	209	RXSF1 - 110-125V DC, 2 NO+1 NC, RED FLAG	JVE+ SNS Ind.
	210	RXSF1 - 220-250V DC, 2 NO+1 NC, RED FLAG	JVE+ SNS Ind.
	211	RXSF1 - 24V DC, 3 NO, RED FLAG	JVE+ SNS Ind.
	212	RXSF1,3 NO CONTACTS, 30V DC	JVE+ SNS Ind.
	213	Make: EM, type RXSF1 60V DC	JVE+ SNS Ind.
	214	RXSF1 - 110-125V DC, 3 NO, RED FLAG	JVE+ SNS Ind.
	215	RXSF1 - 220-250V DC, 3 NO, RED FLAG	JVE+ SNS Ind.
	216	RXSF1 - 24V DC, 6 NO (2 COILS), RED FLAG	JVE+ SNS Ind.
	217	RXSF1-30V DC, 6NO(2COILS), RED FLAG	JVE+ SNS Ind.
	218	RXSF1-48-55V DC,6NO, RED FLAG	JVE+ SNS Ind.
	219	EM Make : RXSF1 60 VDC	JVE+ SNS Ind.
	220	RXSF1-Relay,6NO (2COILS), RED FLAG	JVE+ SNS Ind.
	221	AUXILIARY RELAY -RXSF1	JVE+ SNS Ind.
	222	RXSF1-24V DC, 2NO+4NC (2COILS), RED FLAG	JVE+ SNS Ind.
	223	RXSF1-30V DC,2NO+4NC(2COILS)REDFLAG	JVE+ SNS Ind.
	224	RXSF1-48-55V DC,2NO+4NC(2COILS),RED FLAG	JVE+ SNS Ind.
	225	EM Make : RXSF1 60 VDC	JVE+ SNS Ind.
	226	RXSF1-110 125VDC,2NO+4NC 2COILS REDFLAG	JVE+ SNS Ind.
	227	RXSF1-220-250V DC,2NO+4NC(2COILS)REDFLAG	JVE+ SNS Ind.
	228	RXSF1 - 220-250V DC	JVE+ SNS Ind.
	229	RXSF1-48-55V DC,4NO+2NC(2COILS),R+Y FLAG	JVE+ SNS Ind.
	230	RELAY-RXSF1,MAKE:EM	JVE+ SNS Ind.
	231	RXSF1-110-125V DC,6NO,(2 COILS),R+Y FLAG	JVE+ SNS Ind.
	232	RXSF1-220-250V DC,6NO,(2COILS),R+Y FLAG	JVE+ SNS Ind.
	233	RXSF1	JVE+ SNS Ind.
	234	RELAY RXKF1,2-30s,-24-36v	SNS Ind.
	235	RXKF1,2-30s, - 110-125V	SNS Ind.
	236	RXKF1, 2-30 s, - 220-225V	SNS Ind.
	237	RXIG21- YELLOW FLAG - 0.050-0.150A	SNS Ind.
	238	RXIG21 - YELLOW FLAG - 0.100-0.300A	SNS Ind.
	239	RXIG21 - YELLOW FLAG - 0.250-0.750A	SNS Ind.
	240	RELAY RXIG,MAKE:EM	SNS Ind.
	241	RXIG21 - YELLOW FLAG - 2.5-7.5A	SNS Ind.
	242	RELAY RXIG,MAKE:EM	SNS Ind.
	243	RXIG21- YELLOW FLAG - 0.010-0.030A	SNS Ind.
	244	RXIG21- YELLOW FLAG - 0.025-0.075A	SNS Ind.
	245	RXIG21- YELLOW FLAG - 0.050-0.150A	SNS Ind.
	246	RXIG21- YELLOW FLAG - 0.100-0.300A	SNS Ind.
	247	RXIG21- YELLOW FLAG - 0.25-0.75A	SNS Ind.
	248	RXIG21- YELLOW FLAG - 0.5-1.5A	SNS Ind.
	249	RXIG21- YELLOW FLAG - 1-3A	SNS Ind.
	250	RXIG21- YELLOW FLAG - 2.5-7.5A	SNS Ind.

	251	RXIG21- YELLOW FLAG - 5-15A	SNS Ind.
	252	RXIG21- YELLOW FLAG	SNS Ind.
	253	RXIG28 RELAY, 2C/O, 24VDC	SNS Ind.
	254	CURRENT RELAY	SNS Ind.
	255	RXIG28,50-150mA,-24-48-60V	SNS Ind.
	256	RXIG28 - YELLOW FLAG - 0.5-1.5mA	SNS Ind.
	257	RXIG28 - YELLOW FLAG - 5-15mA	SNS Ind.
	258	RXIG28 - YELLOW FLAG - 10-30mA	SNS Ind.
	259	RXIG28 - YELLOW FLAG - 25-75mA	SNS Ind.
	260	RXIG28 - YELLOW FLAG - 50-150mA	SNS Ind.
	261	RXIG28 - YELLOW FLAG - 100-300mA	SNS Ind.
	262	RELAY RXIG22,MAKE:EM	SNS Ind.
	263	RXIG22 - YELLOW FLAG - 0.100-0.300A	SNS Ind.
	264	RXIG22 - YELLOW FLAG - 0.250-0.750A	SNS Ind.
	265	RXIG22 - YELLOW FLAG - 0.5-1.5A	SNS Ind.
	266	RELAY RXIG22,30 V DC, 0.25 - 0.75A	SNS Ind.
	267	RXIG22 - YELLOW FLAG - 0.010-0.030A	SNS Ind.
	268	RXIG22 - YELLOW FLAG - 0.025-0.075A	SNS Ind.
	269	RXIG22 - YELLOW FLAG - 0.050-0.150A	SNS Ind.
	270	RXIG22 - YELLOW FLAG - 0.100-0.300A	SNS Ind.
	271	RXIG22 -Relay - 0.250-0.750A	SNS Ind.
	272	RXIG22 - YELLOW FLAG - 0.5-1.5A	SNS Ind.
	273	RXIG22 - YELLOW FLAG - 1-3A	SNS Ind.
	274	RXIG22 - YELLOW FLAG - 2.5-7.5A	SNS Ind.
	275	RELAY RXIG,MAKE:EM	SNS Ind.
	276	RXIG28 - 0.1-0.3A ~60HZ	SNS Ind.
	277	RXIG28 FOR RXTFA2	SNS Ind.
	278	RELAY-RXEG 21,MAKE:EM	SNS Ind.
	279	RXEG21 - YELLOW FLAG - 10-30V	SNS Ind.
	280	RELAY-RXEG 21,MAKE:EM	SNS Ind.
	281	RXEG21 - YELLOW FLAG - 40-120V	SNS Ind.
	282	RXEG21 - YELLOW FLAG - 80-240V	SNS Ind.
	283	RXEG 21,MAKE:EM	SNS Ind.
	284	RXEG21 - YELLOW FLAG - 5-15V	SNS Ind.
	285	RXEG21 - YELLOW FLAG	SNS Ind.
	286	RXEG21 - YELLOW FLAG - 20-60V	SNS Ind.
	287	RXEG21 - YELLOW FLAG - 40-120V	SNS Ind.
	288	RXEG21 - YELLOW FLAG - 80-240V	SNS Ind.
	289	RXEG21 - YELLOW FLAG - 160-480V	SNS Ind.
	290	RXIG 21 Over/Under current relay	SNS Ind.
	291	RELAY RXTMA1 ,MAKE:EM	IN HOUSE +SNS
	292	RELAY RXTMA1 ,MAKE:EM	IN HOUSE +SNS
	293	RXTMA1 - RESISTOR UNIT - 150 OHMS	IN HOUSE +SNS
	294	RESISTOR UNIT FOR RXMVB4 TRIP RELAY	IN HOUSE +SNS
	295	RXTMA1 - Resistor Unit - 820 OHMS	IN HOUSE +SNS
	296	RXTMA1 - Resistor Unit - 270 OHMS	IN HOUSE +SNS
	297	RXTMA1 - Resistor Unit - 47OHMS	IN HOUSE +SNS
	298	TSR,220V,1NO+2NC	SNS Ind.
	299	PUSH BUTTON 4NO	SNS Ind.
	300	Push Button Unit 4NO	SNS Ind.
	301	TSR-110-250V DC, 1NO + 2NC	SNS Ind.
	302	Push Button Unit	SNS Ind.
	303	PUSH BUTTON	SNS Ind.
	304	LED UNIT,2 GREEN,220V DC	SNS Ind.
	305	LED UNIT,2 GREEN,110V DC	SNS Ind.
	306	LED UNIT,1 RED+1 GREEN,110V DC,	SNS Ind.

BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

MANUFACTURING QUALITY PLAN -- PVC CONTROL CABLE

M.Q.P. No.- 030

List of component manufacturer

Process Inspection	Process Inspection	Final inspection & testing	Packing & Despatch

Sheet Steel - CRCA

CRCA Sheet

Painting/ Powder Coating

Quality of material, - Thickness
- wavy-ness
- scratches
- Chemical analysis tests

Panel fabrication - Bending
- Welding
- Punching
- De-burring, Etc

Bought-out Items (Out-sourced)
Measuring Instruments, Transducers, Time Interval Meters, Aux CT/ PTs, UPS Inverters, PVC wires, Terminal Blocks, Control switches, Alarm annunciators, Etc

Pre-treatment
- Titration test for seven tank process
  Coating thickness
- Shade
- Checks for adhesion

Bought-out Items (EM Procured)
PCB's /Sub-Assemblies, Disturbance recorders, SER's, Time Sync Eqpts, Computer hardwares, Applicable softwares, Energy Meters, Relays

EM Products (Like Aux relays,OMHB-switches,Etc)

IED Manufacture
Tag Assembly
HV Test
Knot

Cubicle components, - Gaskets
- Earth bus-bar
- Hardwares &
- Associated components

Panel Assembly
- Space heater
- AC lamp
- Heater
- Door switch, Etc

General arrangement Assembly of
- BOM Items/ Mounting
- Bought out items
- PVC Channel
- Wiring strip mounting
- Item designation labelling

Wiring as Per Wiring table,
- Usage of colour wires/ Colour sleeves,
- Usage of Ferrules,
- Usage of specific Trip or as applicable indicating ferrules,
- Usage of Lugs/ Types

Process Checks Mechanical/ Visual
- Availabilty of all Items
- Proper fastening of Items,
- No. Terminal block mountings,
- Mounting locations,
- Crimping quality
- Any Physical damages
- Completion of wiring
- Verification of applicable Routine test certificates Aesthetic and cable routing

Preliminary Acceptance test (In process inspection)
a) Final Assembly Check for
- Basic Assembly
- Mimic Check
- Dimensional Conformity
- Mounting of all Eqpts as/ BOM
- Paint shade
- Paint thickness
- Surface finish
- Adhesion

b) Wiring Check for,
- Wire cross section
- Ferruling
- Crimping
- Continuity tests on maincircuits - Earthing continuity between each apparatus and earth bus
- Insulation testing (Before/ After HV test)
- HV testing

c) Integrated CRP & SAS testing

Final acceptance test
- Operational & Calibration check Protn relays test for all Relays, Instruments, annunciatior's etc
- Operational test (elect. Control Interlock and Sequential Operation)
- check for Annunciation Sequence & inscription details
- Current Injection tests on all instruments/Meters
- Integration test with interfacing of Relays & PC, Printers With applicable software/hardwares
- Integrated CRP & SAS testing
- 100Hr System Avaiability Test

Pre-despatch checks
- Dressing, Routing, Bunching & proper fastening all items in Panel
- Packing worthyness
- Identification marks on packed casing
- Despatch Destination mark
- Storage instructions
- Encloser of applicable documents

Panel ready for Despatch
- Pre-despatch checks
- Check for healthiness of packing
- Verification of CIP/ MICC reference on packing

In-House activty

	BIHAR STATE POWER TRANSMISSION COMPANY LIMITED			
	MANUFACTURING QUALITY PLAN -- PVC CONTROL CABLE			
M.Q.P. No.- 030				
	List of component manufacturer			
Please Refer :-		100Hr Test Procedure.docx		
	CRCA Sheet			

Please Refer : C&R-FAT format.xlsx

Part of MQP No. 030

TEST PROCEDURE AND RECORD FORMAT

Internal Validation	☐	Sl No of the panel:
F.A.T	☐	Sale Order No:
SAT	☐	Project Name:

Test Objective Hardware component identification/healthiness

Initial conditions		**Test Tools** AC/DC source, Multimeter & 3 Ph Injection Kit,
Test conditions Check the BOM & Powering up the Panel		**Referenced Documents** Approved Scheme Drawings,GTP & Tech. Spec

Actions	**Result** Passed	Not Tested	Failed	**Remark**
- Insulation resistance of CT &PT terminals & all relay terminals by 500v megger				
During Internal test IR meas will be carried on 100% panels.Panel test report will be provided.	☐	☐	☐	
During Final Acceptence test IR meas will be carried on the selected panel.	☐	☐	☐	
- Check the BOM as per the approved Scheme Drawings of the Control & Relay panels	☐	☐	☐	
- Select the Control & relay Panel to test on the platform				
- Inject the required DC in the selected panel power supply terminal and check the DC distribution as per the approved	☐	☐	☐	
- After Power-up, check the DC equipments are in healthy state	☐	☐	☐	
-Inject the required AC in the selected panel power supply terminal and check the AC distribution as per the approved	☐	☐	☐	
- After Power-up,check the AC equipments are in healthy state	☐	☐	☐	
- Check the continuity for all control switches operation used for isolater & breaker	☐	☐	☐	
Check the source DC 1 and source DC 2 and AC logics as per the approved scheme	☐	☐	☐	
Repeat the above steps from 1-8 for the other Panels available on the platform	☐	☐	☐	

Software Version:	**N/A**	**Comments:**
Database Version:	**N/A**	
Automation Version:	**N/A**	
Other Version	**N/A**	
Fault Report Nb:		**Attached Documents:**
Comments NB		

Overall Decision:		**Customer Responsible**
☐: Approved	Name	Name
☐: Not completed		
☐: Failed	Date	Date

BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

Part of MQP No. 030

TEST PROCEDURE AND RECORD FORMAT

Internal Validation	☐	Panel Sl No:
F.A.T	☐	Sale Order No:
SAT	☐	Project Name:

Test Objective Functional Check: Indication ,Metering, Auxilary Relays ,Anunciaton Circuit and Protection Circuit

Initial conditions	**Test Tools**
	AC/DC source, Multimeter & 3 Ph Injection Kit,
Test conditions	**Referenced Documents**
Check the above -mentioned Circuit as per scheme	Approved Scheme Drawings,GTP & Tech. Spec

Actions	**Result** Passed	Not Tested	Failed	**Remark**
1] Check the Indication circuit of as per the approved Scheme drawing of the control & relay Panels				
As per approved scheme extend the DC in the indication circuit and semaphore to simulate the Isolator/Circuit Breaker status	☐	☐	☐	
2] Check the Metering circuit of as per the approved Scheme Drawings of the Controls & relay panels				
Connect the 3 Ph Injection Kit on the metering Circuit & inject 3 Ph AC voltage and current to the inputs & observe the following Meters/ Transducers as per approved scheme	☐	☐	☐	
8] Continuity to be checked for synchronizing socket with respect to its terminal as per the scheme drawing. Functioning of synchronizing socket also to be ensured.				
- Volt Meter / Volt Transducer	☐	☐	☐	
- Current Meter / Current Transducer	☐	☐	☐	
- Watt & Var Meter / Watt & Var Transducer	☐	☐	☐	
- PF & Frequency Meter / PF &Frequency Transducer	☐	☐	☐	
3] Check the Auxilary relays of as per the approved Scheme drawings of the Control & Relay Panels				
relays. Also verify the alarm has appeared on the Annunciator alongwith the hooter, if available in tha approved scheme	☐	☐	☐	
Check for the protection circuits				
AS per the Approved Scheme extend the DC for the Particular Protection Circuit	☐	☐	☐	
Check for the operations of the individual protections as per the scheme by secondary injection of voltage and current	☐	☐	☐	
4] Repeat the above steps for other Panels in the platform	☐	☐	☐	

Software Version:	**N/A**	**Comment:**
Database Version:	**N/A**	
Automation Version:	**N /A**	
Other Version	**N/A**	
Fault Report Nb:		**Attached Documents:**
Comments NB		

Overall Decision:		**Customer Responsible**
☐: Approved	Name	Name
☐: Not completed		
☐: Failed	Date	Date

BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

Part of MQP No. 030

TEST PROCEDURE AND RECORD FORMAT

Internal Validation ☐ IED Serial Number:

F.A.T ☐ Project :

SAT ☐ Sale Order Number:

Test Objective Functional Check: For REB670 Numeric Relays

Initial conditions	**Test Tools** AC/DC source, Multimeter & 3 Ph Injection Kit,
Test conditions Functional check for all types of Numerical relays used in the project	**Referenced Documents** Approved Scheme Drawings,GTP & Tech. Spec

Actions	**Result** Passed	Not Tested	Failed	**Remark**
1] Check the Numerical relay for protection as per the following protection function in line with approved scheme drawings: GTP & Tech Spec. The tests will be performed on the BSPTCL approved setting				
- Communication Checks if applicable	☐	☐	☐	
- Time Synchronisation in HMI display	☐	☐	☐	
- Digital Inputs as per scheme	☐	☐	☐	
- Digital output as per scheme	☐	☐	☐	
- Measurment Check	☐	☐	☐	
- Disturbance Recorder check for all binary / Analog inputs	☐	☐	☐	
- Even Handling	☐	☐	☐	
- Built - in Function Checking reference to approved schemetic Drawing: GTP & Tech.Spec	☐	☐	☐	
- Differential Pick up Check and timing check	☐	☐	☐	
- Breaker failure Check	☐	☐	☐	
- Over current Check	☐	☐	☐	
- Stability and Slope Check	☐	☐	☐	
- Open CT Alarm	☐	☐	☐	
2] Repeat the above steps for other C&R Panels in the platform	☐	☐	☐	

Note: Verification & validation of all signals required for display on SCADA as per detailed signal list / configuration / site settings, as applicable, issued by Powergrid

Software Version:		**Comment:**
Database Version:	N/A	
Automation Version:	N/A	
Other Version	N/A	
Fault Report Nb:		**Attached Documents:**
Comments NB		
Overall Decision: ☐: Approved ☐: Not completed ☐: Failed	Name Date	**Customer Responsible** Name Date

ROUTINE TEST REPORT : REB670	
ARTICLE NO	
SCH. DRG. NO	
SALE ORDER NO.	
ORDER NO	
SL. NO	
TRANSFORMER MODULE	
RATING	
AUX. VOLTAGE	
RATED VOLTAGE	
SOFTWARE VERSION	
IED Version (Casing)	

1. VISUAL INSPECTION — **X**
2. DC POWER CONSUMPTION — **mA**
   (110V DC: < 318 mA (for basic) + 9.09mA for each I/O card)
   (220V DC: < 160 mA (for basic) + 4.55mA for each I/O card)
   (50 V DC: < 255 mA (for basic) + 18.18mA for each I/O card)
   (24V DC: < 1330 mA (for basic) + 42 mA for each I/O card)
3. **FUNCTIONAL CHECK:**

DIFFERENTIAL. :

Differential DIFP Zone A

BASIC SETTING :

No. of Bays used = As per BSPTCL approved drg

Operation = ON	Diffl Opt Level =	Default Slope Setting = 53 %	Diffl Current Alarm =
Diffl Current Time =	Incoming Alarm =	Primary =	Secondary = 1 A

Bay Setting

CT Connection = Connected	Zone Selection = FixedToZA	ZoneSwitching = Forced out

Checkzone Setting

Checkzone =	Operation =	Operlevel =	slope =

Differential current operating level (1-100000) A ---------- ± 2.0% of Ir for I < Ir / ± 2.0% of I for I > Ir

Check of Base sensitivity function: Zone A

Tolerance = ± 2%

Bay No.	Id min SET	Expected (1Ph)	Id min OPTD.
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Serial No.

Check of Base sensitivity function: Zone B

Bay No.	Id min SET	Expected (1Ph)	Id min OPTD.
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Slope

Slope set on the relay	Measured I (primary)		Slope = ΔI opt/ΔI bias
	I bias	I operate	
53%			

4 Additional Functions Check :

1. Over Current	
2. Breaker failure	
3. Check Zone Operation	
4. I/O Card 1 Check	
5. I/O Card 2 Check	
6. I/O Card 3 Check	
7. I/O Card 4 Check	-
8. I/O Card 5 Check	-
9. I/O Card 6 Check	-
10. I/O Card 7 Check	-
11 I/O Card 8 Check	-
12. I/O Card 9 Check	-
13. I/O Card 10 Check	-
14. Remote Communication (IEC 61850)	-
15. Disturbance Recorder	-
16. Event Recorder	-

X - Indicates Checked and found Satisfactory

Note: Verification & validation of all signals required for display on SCADA as per detailed signal list / configuration / site settings, as applicable, issued by BSPTCL

1.Tested By **2. Internal Test** **3.3rd Party (If applicable)** **4.FAT**

Date:

BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

Part of MQP No. 030

TEST PROCEDURE AND RECORD FORMAT

Internal Validation	☐	IED Serial Number:
F.A.T	☐	Project :
SAT	☐	Sale Order Number:

Test Objective Functional Check: Transformer Protection (Numeric) Relays (Check List :- Transformer Protn Relays)

Initial conditions	**Test Tools** AC/DC source, Multimeter & 3 Ph Injection Kit,
Test conditions Functional check for all types of Numerical relays used in the project	**Referenced Documents** Approved Scheme Drawings,GTP & Tech. Spec

Actions	**Result** Passed	Not Tested	Failed	**Remark**
1] Check the Numerical relay for protection as per the following protection function in line with approved scheme drawings: GTP & Tech Spec. The tests will be performed on the PGCIL approved setting - Check the hardware configuration along with software version of the relay in line with approved GTP & Tech. Spec.				
- Communication Checks if applicable	☐	☐	☐	
- Time Synchronisation in HMI display	☐	☐	☐	
- Digital Inputs as per scheme	☐	☐	☐	
- Digital output as per scheme	☐	☐	☐	
- Measurment Check	☐	☐	☐	
- Built -in Function Checking reference to approved schemetic Drawing: GTP & Tech.Spec	☐	☐	☐	
- Disturbance Recorder check for all binary / Analog inputs	☐	☐	☐	
- Even Handling	☐	☐	☐	
- High Set Check in Backup O/C, E/F relay, for ICT only	☐	☐	☐	
- Differential Pick up Check & timing check	☐	☐	☐	
- Unrestrained Trip (HIGH SET)	☐	☐	☐	
- 2nd Harmonic Block	☐	☐	☐	
- 5th Harmonic Block	☐	☐	☐	
- Stability and Slope Check	☐	☐	☐	
- Check of HZD Function	☐	☐	☐	
- Over flux function check (pick up and drop off)	☐	☐	☐	
- Thermal Over load Check	☐	☐	☐	
- Over current Check	☐	☐	☐	
2] Repeat the above steps for other C&R Panels in the platform	☐	☐	☐	

Note: Verification & validation of all signals required for display on SCADA as per detailed signal list / configuration / site settings, as applicable, issued by BSPTCL

Software Version:		**Comment:**
Database Version:	**N/A**	
Automation Version:	**N/A**	
Other Version	**N/A**	
Fault Report Nb:		**Attached Documents:**
Comments NB		
Overall Decision: ☐: Approved ☐: Not completed ☐: Failed	Name Date	**Customer Responsible** Name Date

ROUTINE TEST REPORT : RET670 -2 Winding	
ARTICLE NO	
SCH. DRG. NO	
SALE ORDER NO.	
ORDER NO	
SL. NO	
TRANSFORMER MODULE	
RATING	
AUX. VOLTAGE	
RATED VOLTAGE	
SOFTWARE VERSION	
IED Version (Casing)	

1. VISUAL INSPECTION — **X**

2. DC POWER CONSUMPTION — **mA**

(110V DC: < 318 mA (for basic) + 9.09mA for each I/O card)
(220V DC: < 160 mA (for basic) + 4.55mA for each I/O card)
(50 V DC: < 255 mA (for basic) + 18.18mA for each I/O card)

3. **FUNCTIONAL CHECK:**

TRANSFORMER DIFF. :

Differential Protection DIFP

BASIC SETTING :

End Section 1 =	End Section 2 =	Slope Setting 2 =	Id UNRES = Ib
I2/I1 Ratio =	I5/I1 Ratio =	Op Cross Block =	Op Neg Seq Diff = OFF

Check of Base sensitivity function: **Tolerance = ± 2%**

Windings	Id min SET	Expected (1Ph)	Id min OPTD. R-PH	Y- PH	B- PH	Expected (3-PH)	3 Phase
HV							
LV							

Check of unrestrained differential (instantaneous) : **Tolerance = ± 2%**

Windings	Id unre SET	Id unre OPTD. R-PH	Y-PH	B-PH	3 Phase
HV					
LV					

Check of Second Harmonic restraint operation on: **Tolerance = ± 2%**

PHASE	SET	Operated	Blocked
R			
Y			
B			

Check of Fifth Harmonic restraint operation on: **Tolerance = ± 5%**

PHASE	SET	Operated	Blocked
R			
Y			

B			

Serial no.

Check of Operate bias characteristic (Check of slope) : Idmin set =30% Tolerance = ± 2%

Slope set on the relay	Measured I (primary)		Slope = ΔI opt/ΔI Bias
	I bias	I operate	

04. Check of HZD Trip:

Set Resistance in IED: ± 1.0% of Ur for U < Ur
± 1.0% of U for U > Ur

Alarm Operating Range : , Trip Operating Range :

HZD Operating Injecting Voltage

PHASE	SET in Volts	Alarm in Volts	SET in Volts	Trip in Volts
HZD 1		-		-
HZD 2		-		-
HZD 3		-		-

HZD Operation injecting Current Tolerance : - ± 1% of Ir

PHASE	SET in Amps	Alarm in Amps	SET in Amps	Trip in Amps
HZD 1		-		-
HZD 2		-		-
HZD 3		-		-

5 Additional Functions Check :

1.	Restricted Earth Fault	
2.	Instantaneous Over Current	
3.	Time delayed Over Current	
4.	Instantaneous Earth Fault	
5.	Time delayed Earth Fault	
6.	Thermal Over load Protection	
7.	Breakure Failure Protection	
8.	Broken Conductor Protection	
9.	Time delayed Under Voltage	
10.	Time delayed Over Voltage	
11.	Residual Over Voltage	
12.	Over Excitation	
13.	Loss of Voltage	
14.	Under Frequency	
15.	Over Frequency	
16.	Rate of Change of Frequency	
17.	Current Circuit Supervision	
18.	Fuse Failure Supervision	
19.	I/O Card 1 Check	
20.	I/O Card 2 Check	
21.	I/O Card 3 Check	
22.	I/O Card 4 Check	
23.	I/O Card 5 Check	
24.	Remote Communication (IEC 61850)	X
25.	Disturbance Recorder	X
26.	Event Recorder	X
27.	IRIG - B TIME SYNCH (SLOT 302)	-

Note: Verification & validation of all signals required for display on SCADA as per detailed signal list / configuration / site settings, as applicable, issued by BSPTCL

X - Indicates Tested and Found OK

1.Tested By	**2. Internal Test**	**3.3rd Party (If applicable)**	**4.FAT**

Date:

ROUTINE TEST REPORT : RET670 -3Winding

ARTICLE NO	
SCH. DRG. NO	
SALE ORDER NO.	
ORDER NO	
SL. NO	
TRANSFORMER MODULE	
RATING	
RATED VOLTAGE	
AUX VOLTAGE	
SOFTWARE VERSION	
IED Version (Casing)	

1. VISUAL INSPECTION — **X**
2. DC POWER — **mA**

   (110V DC: < 318 mA (for basic) + 9.09mA for each I/O card)
   (220V DC: < 160 mA (for basic) + 4.55mA for each I/O card)
   (50 V DC: < 255 mA (for basic) + 18.18mA for each I/O card)
   (24V DC: < 1330 mA (for basic) + 42 mA for each I/O card)

3. **FUNCTIONAL CHECK:**

TRANSFORMER DIFF. :

Differential Protection DIFP

BASIC SETTING :

End Section 1 =	End Section 2 =	Slope Setting 2 =	Id UNRES = Ib
I2/I1 Ratio =	I5/I1 Ratio =	Op Cross Block =	Op Neg Seq Diff = OFF

Check of Base sensitivity function: Tolerance = ± 2%

Windings	Id min SET	Expected	Id min OPTD.				
			R-PH	Y- PH	B- PH	Expected	3 Phase
		(1Ph)				(3-PH)	
HV							
MV							
LV							

Check of unrestrained differential (instantaneous) :

Windings	Id unre SET	Id unre OPTD.			
		R-PH	Y-PH	B-PH	3 Phase
HV					
MV					
LV					

Check of Second Harmonic restraint operation on:

PHASE	SET	Operated	Blocked
R			
Y			
B			

Check of Fifth Harmonic restraint operation on:

PHASE	SET	Operated	Blocked
R			
Y			
B			

Serial no.

Check of Operate bias characteristic (Check of slope) : Idmin set =30%

Slope set on the relay	Measured I (primary)		Slope = ΔI opt/ΔI bias
	I bias	I operate	

4	Additional Functions Check :	
1	Restricted Eath Fault	-
2	Time delayed Over Current	-
3	Instantaneous Earth Fault	-
4	Time delayed Earth fault	-
5	Thermal Over load	-
6	Breaker failure Protection	-
7	Broken conductor	-
8	Time delayed Over Voltage	-
9	Time delayed Under Voltage	-
10	Residual Over Voltage	-
11	Over Excitation Protection	-
12	Loss of Voltage Check	-
13	Under Frequency Protection	-
14	Over Frequency Protection	-
15	Rate of Change of Frequency	-
16	Current Circiut Supervision	-
17	Fuse Failure Supervision	-
18	I/O Card 1 Check	
19	I/O Card 2 Check	
20	I/O Card 3 Check	-
21	I/O Card 4 Check	-
22	I/O Card 4 Check	-
23	I/O Card 4 Check	-
24	Remote Communication (IEC 61850)	X
25	Disturbance Recorder	X
26	Event Recorder	X
27	IRIG-B Time Synchronisation	-

Note: Verification & validation of all signals required for display on SCADA as per detailed signal list / configuration / site settings, as applicable, issued by BSPTCL

X = Indicated Checked and found Satisfactory

1.Tested By **2. Internal Test** **3.3rd Party (If applicable)** **4.FAT**

Date:

ROUTINE TEST REPORT : RET670

ARTICLE NO	
SCH. DRG. NO	
SALE ORDER NO	
ORDER NO	
SL. NO	
TRANSFORMER MODULE	
RATING	
AUX. VOLTAGE	
RATED VOLTAGE	
SOFTWARE VERSION	
IED Version (Casing)	

1. VISUAL INSPECTION	**X**
2. DC POWER CONSUMPTION	mA

110V DC: < 454.54 mA
220V DC: < 227.27 mA

3. FUNCTIONAL CHECK: Tolerance

a. Check of HZD Trip: **± 1.0% of Ur for U < Ur**

Set Resistance in IED: **± 1.0% of U for U > Ur**

Alarm Operating Range : , Trip Operating Range :

HZD Operating Injecting Voltage

PHASE	SET in Volts	Alarm in Volts	SET in Volts	Trip in Volts
HZD 1				
HZD 2				
HZD 3				

HZD Operation injecting Current **Tolerance : - ± 1% of Ir**

PHASE	SET in Amps	Alarm in Amps	SET in amps	Trip in Amps
HZD 1				
HZD 2				
HZD 3				

4 Additional functions

1 Time Delayed Over Current Protection	
2 Thermal Over Load Protection	
3 Fuse Failure Protection	
4 Time Delayed Earth Fault Protection	
5 Over-excitation	
6 I/O Card 1 Check	
7 I/O Card 2 Check	
8 I/O Card 3 Check	
9 I/O Card 4 Check	
10 I/O Card 5 Check	
11 I/O Card 6 Check	
12 Rear Communication (IEC 61850)	
13 Disturbance Recorder	
14 Event Recorder	
15 Time Synchronisation Module - IRIG-B (SLOT -302)	

Note: Verification & validation of all signals required for display on SCADA as per detailed signal list / configuration / site settings, as applicable, issued by BSPTCL

X - Indicates Checked and found Satisfactory

1.Tested By **2. Internal Test** **3.3rd Party (If applicable)**

Date:

BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

Part of MQP No. 030

TEST PROCEDURE AND RECORD FORMAT

Internal Validation ☐ IED Serial Number:

F.A.T ☐ Project :

SAT ☐ Sale Order Number:

Test Objective Functional Check: FOR REC 670 Numeric Relays

Initial conditions	**Test Tools** AC/DC source, Multimeter & 3 Ph Injection Kit,
Test conditions Functional check for all types of Numerical relays used in the project	**Referenced Documents** Approved Scheme Drawings,GTP & Tech. Spec

Actions	**Result** Passed	Not Tested	Failed	**Remark**
1] Check the Numerical Bay control Unit for control and protrection functions with approved scheme drawings: GTP & Tech Spec. The tests will be performed on the PGCIL approved setting - Check the hardware configuration along with software version of the relay in line with approved GTP & Tech. Spec.				
- Communication Checks if applicable	☐	☐	☐	
- Time Synchronisation in HMI display	☐	☐	☐	
- Digital Inputs as per scheme	☐	☐	☐	
- Digital output as per scheme	☐	☐	☐	
- Milli Amps inputs as per the scheme	☐	☐	☐	
- Measurment Check	☐	☐	☐	
- Built -in Function Checking reference to approved schemetic Drawing: GTP & Tech.Spec	☐	☐	☐	
- Auto reclouser Function Check	☐	☐	☐	
- Synchro check	☐	☐	☐	
- Breaker Failure Function Check	☐	☐	☐	
- Time Delayed Over Current Function Check	☐	☐	☐	
- Time Delayed Earth Fault Function check	☐	☐	☐	
- Check for controls and interlocks	☐	☐	☐	
2] Repeat the above steps for other C&R Panels in the platform	☐	☐	☐	

Note: Verification & validation of all signals required for display on SCADA as per detailed signal list / configuration / site settings, as applicable, issued by BSPTCL

Software Version:		**Comment:**
Database Version:	**N/A**	
Automation Version:	**N/A**	
Other Version	**N/A**	
Fault Report Nb:		**Attached Documents:**
Comments NB		
Overall Decision: ☐ : Approved ☐ : Not completed ☐ : Failed	Name Date	**Customer Responsible** Name Date

ROUTINE TEST REPORT : REC670	
ARTICLE NO	
SCH. DRG. NO	
SALE ORDER NO.	
ORDER NO	
SL. NO	
TRANSFORMER MODULE	
RATING	
AUX. VOLTAGE	
RATED VOLTAGE	
SOFTWARE VERSION	
IED Version (Casing)	

1. VISUAL INSPECTION — **X**

2. DC POWER CONSUMPTION — mA

(110V DC: < 318 mA (for basic) + 9.09mA for each I/O card)
(220V DC: < 160 mA (for basic) + 4.55mA for each I/O card)
(50 V DC: < 255 mA (for basic) + 18.18mA for each I/O card)

3. Check of Measurements :

Tolerance: Amplitude ± 1%

CH NO.	INJECTED	Measured in volts / Amps	Frequency
1	1 Amp	0.999	50 Hz
2	1 Amp	1.000	50 Hz
3	1 Amp	0.999	50 Hz
4	1 Amp	1.000	50 Hz
5	1 Amp	1.000	50 Hz
6	1 Amp	1.000	50 Hz
7	63.5 Volts	63.522	50 Hz
8	63.5 Volts	63.479	50 Hz
9	63.5 Volts	63.481	50 Hz
10	63.5 Volts	63.500	50 Hz
11	63.5 Volts	63.499	50 Hz
12	63.5 Volts	63.491	50 Hz

Serial no.	0

4. Additional Functions :

1.	Time Delayed UnderVoltage	
2.	Synchro Check	
3.	Auto Reclosure	
4.	Fuse Failure Protection	
5.	Check of I /O Card	
6.	Check of I /O Card	
7.	Check of I /O Card	
8.	Check of I /O Card	
9.	Check of I /O Card	
10.	Check of I /O Card	
11.	Check of I /O Card	-
12.	Check of I /O Card	-
13.	Check of I /O Card	-
14	Check of I /O Card	-
15	Check of I /O Card	-
16	Check of I /O Card	-
17	Check of I /O Card	-
18	Check of I /O Card	-
19	Rear Communication (IEC 61850)	X
20	Event Recorder	X
21	Disturbance Recorder	X

Note: Verification & validation of all signals required for display on SCADA as per detailed signal list / configuration / site settings, as applicable, issued by BSPTCL

X - Indicates Tested and Found OK.

1.Tested By **2. Internal Test** **3.3rd Party (If applicable)** **4.FAT**

Date:

BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

Part of MQP No. 030

TEST PROCEDURE AND RECORD FORMAT

Internal Validation ☐ IED Serial Number:

F.A.T ☐ Project :

SAT ☐ Sale Order Number:

Test Objective Functional Check: FOR REL 670 Numeric Relays

Initial conditions	**Test Tools** AC/DC source, Multimeter & 3 Ph Injection Kit,
Test conditions Functional check for all types of Numerical relays used in the project	**Referenced Documents** Approved Scheme Drawings,GTP & Tech. Spec

Actions	**Result** Passed	Not Tested	Failed	**Remark**
1] Check the Numerical relay for protection as per the following protection function in line with approved scheme drawings: GTP & Tech Spec. The tests will be performed on the PGCIL approved setting - Check the hardware configuration along with software version of the relay in line with approved GTP & Tech. Spec.				
- Communication Checks if applicable	☐	☐	☐	
- Time Synchronisation in HMI display	☐	☐	☐	
- Digital Inputs as per scheme	☐	☐	☐	
- Digital output as per scheme	☐	☐	☐	
- Measurment Check	☐	☐	☐	
- Disturbance Recorder check for all binary / Analog inputs	☐	☐	☐	
- Even Handling	☐	☐	☐	
- Built -in Function Checking reference to approved schemetic Drawing: GTP & Tech.Spec	☐	☐	☐	
- Zone Reach Check for all the Zones including timings	☐	☐	☐	
- Automatic Switch on to Fault	☐	☐	☐	
- Power Swing Detection	☐	☐	☐	
- Scheme Communcation Function check (ZCOM)	☐	☐	☐	
- WEI Check	☐	☐	☐	
- Brocken Conductor Check	☐	☐	☐	
- Directional E/F Check (IDMT and Instantaneous)	☐	☐	☐	
- Two Step Over Voltage Check	☐	☐	☐	
- Fuse Failure Protection	☐	☐	☐	
- Fault Locator	☐	☐	☐	
- Current reversal and Weak End Infeed	☐	☐	☐	
- STUB Protection	☐	☐	☐	
2] Repeat the above steps for other C&R Panels in the platform	☐	☐	☐	

Note: Verification & validation of all signals required for display on SCADA as per detailed signal list / configuration / site settings, as applicable, issued by Powergrid

Software Version:		**Comment:**
Database Version:	**N/A**	
Automation Version:	**N/A**	
Other Version	**N/A**	
Fault Report Nb:		**Attached Documents:**
Comments NB		
Overall Decision: ☐: Approved ☐: Not completed ☐: Failed	Name Date	**Customer Responsible** Name Date

BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

Part of MQP No. 030

ROUTINE TEST REPORT : REL670	
ARTICLE NO	
SCH. DRG. NO	
SALE ORDER NO.	
ORDER NO	
SL. NO	
TRANSFORMER MODULE	
RATING	
AUX. VOLTAGE	
RATED VOLTAGE	
SOFTWARE VERSION	
IED Version (Casing)	

1. VISUAL INSPECTION — **X**

2. DC POWER CONSUMPTION — 99 mA

(110V DC: < 318 mA (for basic) + 9.09mA for each I/O card)

(220V DC: < 160 mA (for basic) + 4.55mA for each I/O card)

(50 V DC: < 255 mA (for basic) + 18.18mA for each I/O card)

3. **REACH MEASUREMENTS:**

Relay Settings:

X1		**RFFWPP**		**RFRVPP**		**RLDFW / RV**	
X0		**RFFWPE**		**RFRVPE**		**ArgLd**	
X1FwPP		**R1PP**		**RFFwPE**		**RFFwPP**	
X1FwPP		**R1PP**		**RFFwPE**		**RFFwPP**	
X1FwPP		**R1PP**		**RFFwPE**		**RFFwPP**	

XOPE		**ROPE**		**t1**	
XOPE		**ROPE**		**t2**	
XOPE		**ROPE**		**t3**	

Phase to Neutral Measurement:

	Z	Z			
ZONES	**ANGLE**	**EXPECTED**	**RN**	**SN**	**TN**
ZONE1	**0**				
	80				
	90				
ZONE2	**0**				
	80				
	90				
ZONE3	**0**				
	80				
	90				
ZONE4	**0**				
	80				
	90				
ZONE5	**0**				
	80				
	90				

Serial No:	0

Phase to Phase Measurement:

	Z	Z				
ZONES	ANGLE	EXPECTED	RS	ST	TR	RST
ZONE1	0					
	80					
	90					
ZONE2	0					
	80					
	90					
ZONE3	0					
	80					
	90					
ZONE4	0					
	80					
	90					
ZONE5	0					
	80					
	90					

4. TIMING CHECK:

Type of Fault	Expected	Meas (ms)
RN	≤ 34 ms	
SN	≤ 34 ms	
TN	≤ 34 ms	
RS	≤ 34 ms	
ST	≤ 34 ms	
TR	≤ 34 ms	
RST	≤ 34 ms	

5. DISTANCE TO FAULT LOCATOR:

Relay Settings:

X1L		R1L		XOL		ROL	
X1A		R1A		X1B		R1B	
XM		RM					

For 1 Ph Faults : Z =

For 2 Ph & 3Ph Faults : Z =

Expected:

Type of Fault	Measured Value
RN	
SN	
TN	
RS	
ST	
TR	
RST	

6. POWER SWING BLOCK:

Outside boundary set 1.25 times of R and X reach

	Set	Expected	Optd
Rpsb			
Xpsb			

Serial No:	0

7.	Automatic SOTF	
8.	Instantaneous Over Current	
9.	Time delayed Over Current	
10.	Instantaneous Earth Fault	
11.	Time delayed Earth Fault	
12.	Breaker Failure Protection	
13.	Stub Protection	
14.	Pole Discordance	
15.	Broken Conductor	
16.	Time delayed Under Voltage	
17.	Time delayed Over voltage	
18.	Loss of Voltage	
19.	Under Frequency	
20.	Rate of Change of Frequency	
21.	Current Circuit Supervision	
22.	Fuse Failure Supervision	
23.	Synchro Check	
24.	AutoReclosure	
25.	Scheme Communication	
26.	Current Reversal and Weak End Infeed	
27.	Directional Check	
28.	Timers	
29.	I/O Card 1 Check (BIM)	
30.	I/O Card 2 Check (BOM)	
31.	I/O Card 3 Check (BOM)	
32.	I/O Card 4 Check (BIM)	
33.	I/O Card 5 Check	
34.	Disturbance Recorder	
35.	Event Recorder	
36.	Rear Communication (IEC 61850)	
37.	IRIG -B Time Synchronisation Modue (SLOT 302)	
38	LDCM @ Slot 312	

X - Indicates Checked and found Satisfactory

Note: Verification & validation of all signals required for display on SCADA as per detailed signal list / configuration / site settings, as applicable, issued by BSPTCL

1.Tested By **2. Internal Test** **3.3rd Party (If applicable)** **4.FAT**

Date:

BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

Part of MQP No. 030

ROUTINE TEST REPORT : REL670

ARTICLE NO	
SCH. DRG. NO	
SALE ORDER NO.	
ORDER NO	
SL. NO	
TRANSFORMER MODULE	
RATING	
AUX. VOLTAGE	
RATED VOLTAGE	
SOFTWARE VERSION	
IED Version (Casing)	

1. VISUAL INSPECTION — **X**
2. DC POWER CONSUMPTION — mA

   (110V DC: < 318 mA (for basic) + 9.09mA for each I/O card)
   (220V DC: < 160 mA (for basic) + 4.55mA for each I/O card)
   (50 V DC: < 255 mA (for basic) + 18.18mA for each I/O card)

3. **REACH MEASUREMENTS:**

   Relay Settings:

ZMH1	ZPE		ZAngPE		KN		KNAng	
ZMH2	ZPE		ZAngPE		KN		KNAng	
ZMH3	ZPE		ZAngPE		KN		KNAng	

ZMH1	ZRevPE		ZPP		ZAngPP		ZRevPP	
ZMH2	ZRevPE		ZPP		ZAngPP		ZRevPP	
ZMH3	ZRevPE		ZPP		ZAngPP		ZRevPP	

Phase to Neutral Measurement:

ZONES	Z ANGLE	Z EXPECTED	RN	SN	TN
ZONE1	0				
	85				
	90				
ZONE3	0				
	85				
	90				
ZONE4	0				
	85				
	90				

Serial No:	0

Phase to Phase Measurement:

ZONES	Z ANGLE	Z EXPECTED	RS	ST	TR	RST
ZONE1	0					
	85					
	90					
ZONE3	0					
	85					
	90					
ZONE4	0					-
	85					-
	90					-

4. **TIMING CHECK:**

Type of Fault	Expected	Meas (ms)
RN	≤ 34 ms	
SN	≤ 34 ms	
TN	≤ 34 ms	
RS	≤ 34 ms	
ST	≤ 34 ms	
TR	≤ 34 ms	
RST	≤ 34 ms	

5. **DISTANCE TO FAULT LOCATOR:**

Relay Settings:

XIL		RIL		XOL		ROL	
X1A		R1A		X1B		R1B	
XM		RM					

For 1 Ph : Z =
For 2 Ph & 3Ph Faults : Z =
Expected:

Type of Fault	Measured Value
RN	-
SN	-
TN	-
RS	-
ST	-
TR	-
RST	-

Serial No	0

	Set	Expected	Optd
Rpsb			-
Xpsb			-

7. Additional Functions

1. Automatic SOTF	-
2. Instantaneous Over Current	-
3. Time delayed Over Current	-
4. Instantaneous Earth Fault	-
5. Time delayed Earth Fault	-
6. Thermal over Load	-
7. Breaker Failure Protection	-
8. Stub Protection	-
9. Pole Discordance	-
10. Over Excitation	-
11. Time delayed Under Voltage	-
12. Time delayed Over Voltage	-
13. Residual Over Voltage	-
14. Loss of Voltage Check	-
15. Under Frequency	-
16. Over Frequency	-
17. Rate of Change of Frequency	-
18. Current Circuit Supervision	-
19. Fuse Failure Supervision	
20. Synchro Check	-
21. Auto Reclosure	-
22. Timers	-
23. I/O Card 1 Check	
24. I/O Card 2 Check	-
25. I/O Card 3 Check	-
26. I/O Card 4 Check	-
27. I/O Card 5 Check	-
28. Disturbance Recorder	X
29. Event Recorder	X
30. Communication Check - (IEC 61850)	X
31. IRIG TIME SYNC	-

Note: Verification & validation of all signals required for display on SCADA as per detailed signal list / configuration / site settings, as applicable, issued by BSPTCL

X - Indicates Checked and found Satisfactory

1.Tested By **2. Internal Test** **3.3rd Party (If applicable)** **4.FAT**

Date:

BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

Part of MQP No. 030

TEST PROCEDURE AND RECORD FORMAT

Internal Validation ☐ IED Serial Number:

F.A.T ■ Project :

SAT ☐ Sale Order Number:

Test Objective Functional Check: FOR REB 500 Numeric Relays

Initial conditions	**Test Tools**
	AC/DC source, Multimeter & 3 Ph Injection Kit,
Test conditions	**Referenced Documents**
Functional check for all types of Numerical relays used in the project	Approved Scheme Drawings,GTP & Technical Specifications

Actions	**Result** Passed	Not Tested	Failed	**Remark**
1] Check the Numerical relay for protection as per the following protection function in line with approved scheme drawings: GTP & Tech Spec. The tests will be performed on the PGCIL approved setting - Check the hardware configuration along with software version of the relay in line with approved GTP & Tech. Spec.				
- Communication Checks if applicable	☐	☐	☐	
- Time Synchronisation in HMI display (together with the Central Unit)	☐	☐	☐	
- Digital Inputs as per scheme	☐	☐	☐	
- Digital output as per scheme	☐	☐	☐	
- Measurment Check	☐	☐	☐	
- Disturbance Recorder check for all binary / Analog inputs	☐	☐	☐	
- Built - in Function Checking reference to approved schemetic Drawing: GTP & Tech.Spec	☐	☐	☐	
- Even Handling	☐	☐	☐	
- Differential Pick up Check	☐	☐	☐	
- Breaker failure Check	☐	☐	☐	
- Over current Check	☐	☐	☐	
- Open CT Alarm	☐	☐	☐	
- Stability and Slope Check (Together With the Central Unit)	☐	☐	☐	
2] Repeat the above steps for other C&R Panels in the platform	☐	☐	☐	

Note: Verification & validation of all signals required for display on SCADA as per detailed signal list / configuration / site settings, as applicable, issued by BSPTCL

		Comment:
Software Version:		
Database Version:	**N/A**	
Automation Version:	**N/A**	
Other Version	**N/A**	
Fault Report Nb:		**Attached Documents:**
Comments NB		
Overall Decision: ■: Approved ☐: Not completed ☐: Failed	**ABB Ltd.** Name Date	**Customer Responsible** Name Date

DOC NO : FAT-007

BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

Part of MQP No. 030

TEST PROCEDURE AND RECORD FORMAT

Internal Validation ☐ IED Serial Number:

F.A.T ☐ Project :

SAT ☐ Sale Order Number:

Test Objective Functional Check: FOR NON ABB Make Numeric Relays

Initial conditions	**Test Tools** AC/DC source, Multimeter & 3 Ph Injection Kit,
Test conditions Functional check for all types of Numerical relays used in the project	**Referenced Documents** Approved Scheme Drawings,GTP & Tech. Spec

Actions	**Result** Passed	Not Tested	Failed	**Remark**
1] Check the Numerical relay for protection as per the following protection function in line with approved scheme drawings: GTP & Tech Spec. The tests will be performed on the PGCIL approved setting - Check the hardware configuration along with software version of the relay in line with approved GTP & Tech. Spec.				
- Communication Checks if applicable	☐	☐	☐	
- Time Synchronisation in HMI display	☐	☐	☐	
- Digital Inputs as per scheme	☐	☐	☐	
- Digital output as per scheme	☐	☐	☐	
- Measurment Check	☐	☐	☐	
- Disturbance Recorder check for all binary / Analog inputs	☐	☐	☐	
- Built -in Function Checking reference to approved schemetic Drawing: GTP & Tech.Spec	☐	☐	☐	
- Zone Reach Check for all the Zones including timings	☐	☐	☐	
- Automatic Switch on to Fault	☐	☐	☐	
- Power Swing Detection	☐	☐	☐	
- Scheme Communcation Function check (ZCOM)	☐	☐	☐	
- WEI Check	☐	☐	☐	
- Brocken Conductor Check	☐	☐	☐	
- Directional E/F Check (IDMT and Instantaneous)	☐	☐	☐	
- Two Step Over Voltage Check	☐	☐	☐	
- Fuse Failure Protection	☐	☐	☐	
- Fault Locator	☐	☐	☐	
- STUB Protection	☐	☐	☐	
2] Repeat the above steps for other C&R Panels in the platform	☐	☐	☐	

		Comment:
Software Version:		
Database Version:	**N/A**	
Automation Version:	**N/A**	
Other Version	**N/A**	

	Attached Documents:
Fault Report Nb:	
Comments NB	

Overall Decision:		**Customer Responsible**
☐: Approved	Name	Name
☐: Not completed		
☐: Failed	Date	Date

DOC NO : FAT-008

BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

Part of MQP No. 030

TEST PROCEDURE AND RECORD FORMAT

Internal Validation ☐
F.A.T ☐
SAT ☐

IED Serial Number:
Project :
Sale Order Number:

Test Objective Functional Check: Combiflex Relays

Initial conditions	**Test Tools** AC/DC source, Multimeter & 3 Ph Injection Kit,
Test conditions Functional check for all types of Numerical relays used in the project	**Referenced Documents** Approved Scheme Drawings,GTP & Tech. Spec

Actions	**Result** Passed	Not Tested	Failed	**Remark**
1] Check the Non Numeric relay for protection as per the following protection function in line with approved scheme drawings: GTP & Tech Spec. The tests will be performed on the PGCIL approved setting - Check the hardware configuration along with software version of the relay in line with approved GTP & Tech. Spec.				
- Built -in Function Checking reference to approved schemetic Drawing: GTP & Tech.Spec	☐	☐	☐	
- For protections check please refer the following				
1. Check of Autoreclosure				
- Check of 1ph Dead time Operating time	☐	☐	☐	
- Check of 3ph Dead Time Operating Time	☐	☐	☐	
- Check of Reclaim Time	☐	☐	☐	
2. Check of Synchrocheck				
- Check of Amplitude and Phase angle Difference	☐	☐	☐	
- Check of Dead Line Chaarging and Bead Bus Charging Voltages for different Setting of Voltage	☐	☐	☐	
3. Check of Breaker Failure Protection				
- Operation of the Relay for different settings of the current and the timing check	☐	☐	☐	
4.Check of OverExcitation Protection				
- Check for the Alarm and Trip for different Voltage Settings and the Operating Time	☐	☐	☐	
5. Check of Frequency Relays				
- Check for the operation of the Over and Under Frequency for the set Frequency	☐	☐	☐	
6 Check of Over Current and Earth Fault Relays				
- check for the operation of the Overcurrent Relay for the Set Current	☐	☐	☐	
- Check for the Operation of the Earth Fault relay for the Set current	☐	☐	☐	
- Check for the Highset operation of the set current	☐	☐	☐	
-2nd and 5th Harmonic blocking and Biasing check (If Applicable)	☐	☐	☐	
2] Repeat the above steps for other C&R Panels in the platform	☐	☐	☐	

Software Version:		**Comment:**
Database Version:	**N/A**	
Automation Version:	**N/A**	
Other Version	**N/A**	

Fault Report Nb: **Attached Documents:**

Comments NB

Overall Decision:	**ABB Ltd.**	**Customer Responsible**
☐: Approved	Name	Name
☐: Not completed		
☐: Failed	Date	Date

DOC NO : FAT-009

BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

Part of MQP No. 030

TEST PROCEDURE AND RECORD FORMAT

Internal Validation ☐ IED Serial Number:

F.A.T ☐ Project :

SAT ☐ Sale Order Number:

Test Objective Functional Check: Numerical Relays

Initial conditions	**Test Tools** AC/DC source, Multimeter & 3 Ph Injection Kit,
Test conditions Functional check for all types of Numerical relays used in the project	**Referenced Documents** Approved Scheme Drawings,GTP & Tech. Spec

Actions	**Result** Passed	Not Tested	Failed	**Remark**
1] Check theCombiflex relay for protection as per the following protection function in line with approved scheme drawings: GTP & Tech Spec. The tests will be performed on the PGCIL approved setting				
- Check the hardware configuration in line with approved GTP & Tech. Spec.				
- Communication Checks if applicable	☐	☐	☐	
- Time Synchronisation in HMI display	☐	☐	☐	
- Digital Inputs as per scheme	☐	☐	☐	
- Digital output as per scheme	☐	☐	☐	
- Measurment Check	☐	☐	☐	
- Built -in Function Checking reference to approved schemetic Drawing: GTP & Tech.Spec	☐	☐	☐	
- For protections check pleaes refer the following				
- For Distance Protection of (REL 670)make Please refer Format number **DOC NO : FAT -006**	☐	☐	☐	
- For Transformer Protection (RET 670)Please refer Format number **DOC NO : FAT -004**	☐	☐	☐	
- For Centralised Bus Bar Protection(REB 670)Please refer Format number **DOC NO : FAT -003**	☐	☐	☐	
- For De - Centralised Bus Bar Protection (REB500) Please refer Format number **DOC NO : FAT -007**	☐	☐	☐	
- For Distance Protection of Non EM make Please refer Format number **DOC NO : FAT -008**	☐	☐	☐	
- For Control Please (REC 670)refer Format number **DOC NO : FAT -005**	☐	☐	☐	
2] Repeat the above steps for other C&R Panels in the platform	☐	☐	☐	

Software Version:		**Comment:**
Database Version:	**N/A**	
Automation Version:	**N/A**	
Other Version	**N/A**	
Fault Report Nb:		**Attached Documents:**
Comments NB		
Overall Decision:		**Customer Responsible**
☐ : Approved	Name	Name
☐ : Not completed		
☐ : Failed	Date	Date

BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

Part of MQP No. 030

Test Procedure for CRP Testing

Sl No.	Description	Reference
1	For Hardware component identification/healthiness	DOC NO : FAT-001
2	Functional Check: Indication ,Metering, Auxilary Relays ,Anunciaton Circuit and Protection Circuit	DOC NO : FAT-002
3	Functional Check for REB670 Numeric Relays	DOC NO : FAT-003
4	Functional Check for RET670 Numeric Relays	DOC NO : FAT-004
5	Functional Check for REC670 Numeric Relays	DOC NO : FAT-005
6	Functional Check for REL670 Numeric Relays	DOC NO : FAT-006
7	Functional Check for REB500 Numeric Relays	DOC NO : FAT-007
8	Functional Check for NON EM Make	DOC NO : FAT-008
9	Functional check for Combiflex Relays	DOC NO : FAT-009
10	Functional Check for Numerical Relays	DOC NO : FAT-010

Test Procedure- 100 hours integrated test for

Substation automation system

General

The objective of this test is to verify system stability for 100 hours as per the technical specification and approved project documents. The test is carried out during the factory acceptance test when the current scope of the project consists of both station level and bay level devices supplied by Equipment Manufacturer.

System setup

The test setup shall be based on the approved system architecture under the scope of the project. The station and bay level devices shall be connected as per the agreed system architecture for the test. The whole set up shall be powered by uninterrupted control supply for the entire duration of the test. Before commencement of the test it should be ensured that all IEDs under the scope of the system test are healthy, operational, time synchronized and communicating.

The test

Test start date and time to be noted and the last eventjust before the start of the test shall also to be noted. During the test normal operationsmay be performed from time to time to ensure the availability of the system. The system shall run continuously for one hundred hours.

At the end of one hundred hours, test end date and time to be noted and the last event before the end of the test shall also be noted. The event list shall be filtered between start and end date and time for analysis.

Criteria for passing the test

Analyzing the event list between start and the end date and time of the test, there should not be any event leading to a clear indication of the following:

1. Loss of communication or link break
2. Failure of IED or restart of IED
3. Loss of any critical function

In the event of failure of the test the test shall be repeated.

Reference

SAS technical specification