



BALAJI ELECTRO CONTROLS PVT. LTD.

MANUFACTURING QUALITY PLAN

LT PANELS
(PCC, PMCC, MCC, IMCC, & OTHER PANELS)

PROCESS FLOW DIAGRAM FOR PANEL

MANUFACTURING

8.2.0

REV:01

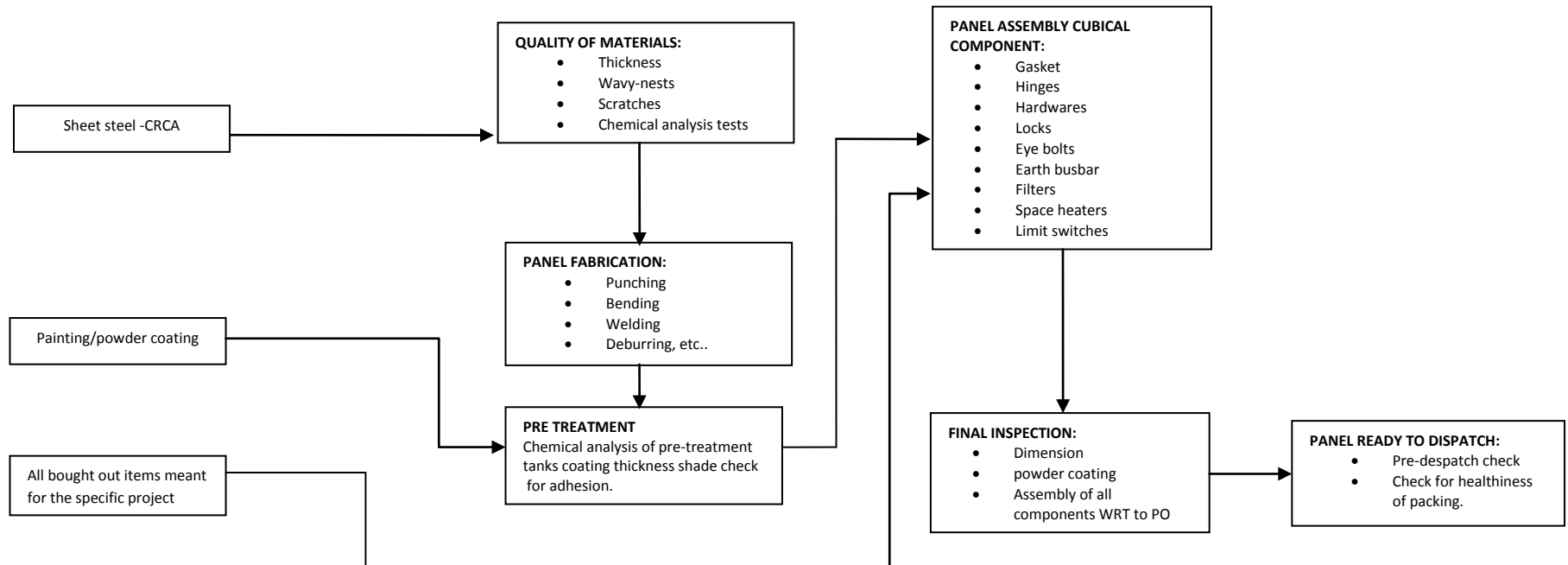
DATE: 01/01/2013

Raw materials inspection

Process inspection

Final inspection & check

Packing & despatch



PANEL ASSEMBLY CUBICAL COMPONENTS:

- Gasket
- Hinges
- Hardware's
- Locks
- Eye bolts
- Earth bus bar
- Filters
- Space heaters

All brought out items ACBS, MCCB,S MCBS,ELMCB'S,RCBOS, RELAYS,METERS,CONTACTORS, ANNOUNCITORS, WIRES, BUSBARS & others Electricals components .

General arrangement assembly of BOM items/mounting bought out items, PVC channel,Buabars mountings SMC,DMC
Wring strip mounting
Item designation labelling

Bus bars assembly,
Wring as per wring table Usage of colour wires/colour sleeves, usage of ferules, usage of specific trips or as applicable indicating ferules,

PROCESS CHECKS MECHANICAL / VISUAL:

- Availability of all items
- Proper fastening of items ,
- No terminal block mounting ,
- Mounting location
- Crimping quality
- Any physical damages
- Completion of wring
- Verification of applicable Routine test

WIRING CHECK FOR:

- Busbars routing
- Wire cross section ferruling
- Crimping
- Continuity test of main circuits
- Earthing continuity between each apparatus and earth bus.

FINAL ACCEPTANCE TEST :

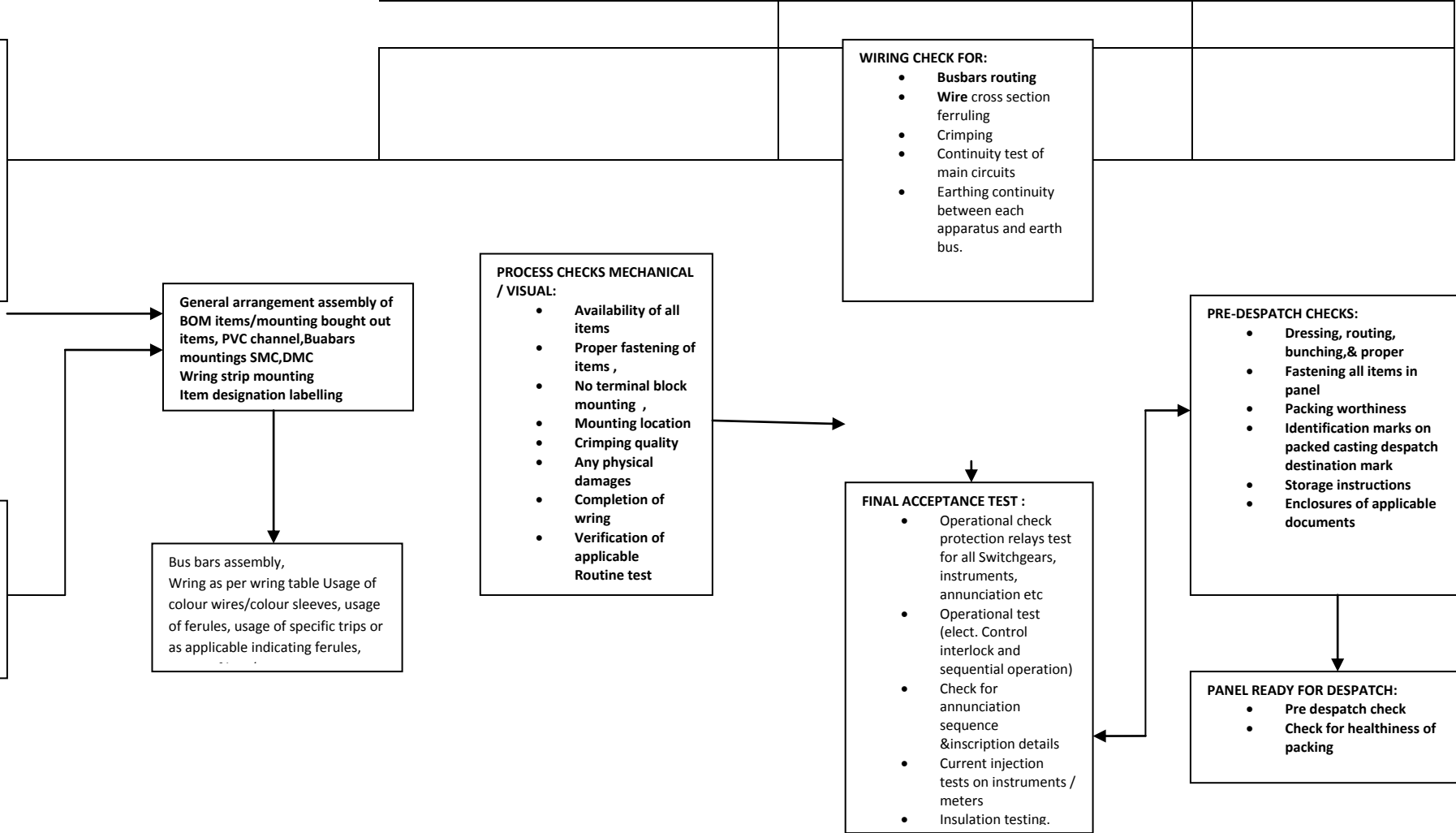
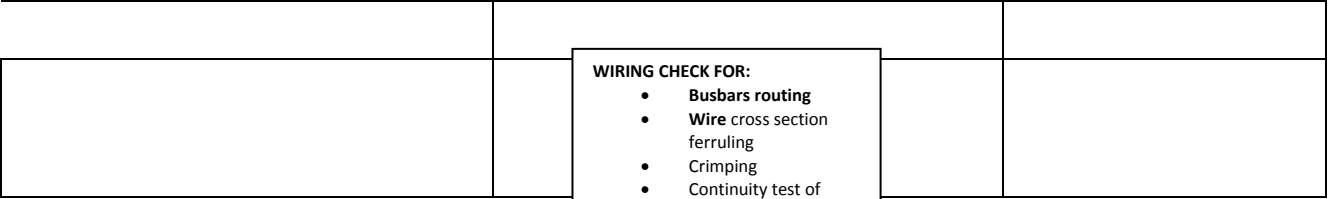
- Operational check protection relays test for all Switchgears, instruments, annunciation etc
- Operational test (elect. Control interlock and sequential operation)
- Check for annunciation sequence &inscription details
- Current injection tests on instruments / meters
- Insulation testing.

PRE-DESPATCH CHECKS:

- Dressing, routing, bunching,& proper
- Fastening all items in panel
- Packing worthiness
- Identification marks on packed casting despatch destination mark
- Storage instructions
- Enclosures of applicable documents

PANEL READY FOR DESPATCH:

- Pre despatch check
- Check for healthiness of packing





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**MANUFACTURING QUALITY PLAN FOR
LT PANELS
(PCC,PMCC,MCC,IMCC,& OTHER PANELS)**

**QA: 4.2.3/D/01
REV: 01
DATE:01/01/2013**

MANUFACTURER'S NAME AND ADDRESS BALAJI ELECTRO CONTROLS PVT LTD., #36/2, MADANAYAKANAHALLI, NEAR BHORUKA SCHOOL, TUMKUR ROAD, BANGALORE-562123		CUSTOMER		VENDOR'S CODE:	ITEM:	
SR.N O	COMPONENTS / OPERATIONS & DESCRIPTION OF test.	TYPE OF CHECK	QUANTUM OF CHECK / SAMPLING WITH BASIS	ACCEPTANCE NORMS	LT PANEL REFERENCE DOCUMENT FOR TESTING	RESPONSIBILITY
A	RAW MATERIAL INSPECTION					QA
1	ENCLOSURE (PANEL , KIOSK)					
1.1	SHEET STEEL CRCA					
A	Dimension conformity including thickness	Measurement	Minimum of 1 sheet each size per lot.	As per IS-513	IQC	
B	Surface finish	Visual	100%		IQC	
C	Bend test	Mechanical	1 sample / lot		TEST CERTIFICATE	
D	Chemical composition	Chemical	Once in 6 Months	Chemical composition: Carbon -012Max, Manganese-05Max, Phosphorous -0.04Max, Sulphur-0.04Max. as per 513-1994 Gr D	Customer test report , 3 rd party inspection report.	
1.2	WELDING RODS					
A	Make	visual	100%		VENDOR test report	
B	Chemicals composition	visual	100%		VENDOR test report	
C	Packing	visual	100%		VENDOR test report	
1.3	POWDER			As per RAL/IS Standards		
A	Shade	visual	1 sample / lot		IQC	
B	Shelf life	visual	1 sample / lot		IQC	
2	FABRICATION			As per customer requirement		
2.1	PANEL					
A	Dimensional conformity	Measurement	100%		IQC	
B	Bend angle	Measurement	100%		IQC	
C	Profile	visual	100%		IQC	
D	Debarring	visual	100%		IQC	
E	Slag removal	visual	100%		IQC	
2.2	Surface preparation Pre-treatment					
A	Weight test report	Measurement	At random		IQC/ VENDOR test report	
B	Titration report	Measurement	100%		IQC /VENDOR test report	
2.5	Powder coating/baking					QA

A	Surface finish	visual	100%	As per customer requirement	IQC /VENDOR test report	
B	Coating thinness	Measurement	At random	As per customer requirement	IQC /VENDOR test report	
C	Powder shade	visual	100%	As per customer requirement	IQC /VENDOR test report	
D	Scratch test report	Functional check	At random		Supplier test report	
E	Bend test	Functional check	At random		Supplier test report	
2.6	Gasket Dimensional conformity , surface finish & compressibility visual measurement ,	Visual/measurement	One sample per lot	As per customer requirement	Supplier test report	
2.7	ASSEMBLED PANEL WITH ASSOCIATED COMPONENTS (door switches, space heaters, thermostats, compact fluorescent / lamps) position of components assembly type & quantity of components assembled quality of assembly.	Functional / visual d tests	100%	As per customer drawing.	IQC	
3.1	VARIOUS OTHER COMPONENTS RAW MATERIALS (brought out items) MCBs, MCCB/ACBs ,SEL SWITCHES / CONTROL SWITCHES , TEST TERMINALS BLOCKS , PUSH BUTTONS , RELAYS , ETC...	Functional / visual tests	100%	As per customer requirement	IQC	
3.2	INDICATING LAMPS , FUSES , HOOTERS/BELLS / BUZZERS , HARDWARE'S LIKE LUGS , SADDLES , FERRULES , , WIRE STRIPS , PVC CHANNELS , CLIPS , DESIGNATION LABELS , STUDS , COMBIFLEX , SOCKTES , PINS , TEST SWITCHES , RELAY BASES, BRANCH CONNECTORS , ETC...	Functional / visual tests	100%	As per customer requirement	Supplier test report / IQC	
4	Busbars/wiring					
4.1	Busbars aluminium/copper/GI of various sizes & controls wires.	Functional / visual tests	100%	As per customer requirement	VENDOR test report	
5	MEASURING INSTRUMENTS (ANALOG / DIGITAL) , VOLT METERS , AMMETERS , WATTMETERS , VAR METERS , MDM METERS , PF METERS , HZ METERS , TEMP.. METERS , RECORDS, ENERGY METERS, ETC....,	ELECTRICAL	Manufactures test		VENDOR test report/ IQC	
5.1	H.V TEST : 2.5KV FOR 1 MIN IN PANEL ASSEMBLY	ELECTRICAL			VENDOR test report	
6	PLC's	Operational test	100%		IQC	
7	CURRENT / VOLTAGE TRANSFORMERS				IQC	
7.1	Name plates, CT/PT ratio , rated burden , accuracy class , termination , mounting accessories.	Visual check & dimensional conformity	100%	AS PER SPECIFICATION & CALIBRATION	IQC	
10	ANNUNCIATORS					
10.1	Type , no of windows , rows /columns , aux. supply voltage , initiation by NO/NC , accessories , test (inscription)	Visual check & dimensional conformity	100%	Test conformity	IQC	
10.2	Functional check for lamp / alarm test ,trip/ non trip segregation , fault indication order , any other sp. Features , H.V test for 1min	electrical		Test conformity	IQC	

B	IN PROCESS INSPECTION					QA
1	PROCESS CHECKS PANEL WIRING & ASSEMBLY					
1.1	Availability of all items	VISUAL	100%	As per requirement	IQC	
1.2	Proper fastening of items	VISUAL	At random		IQC	
1.3	No terminal block mountings	VISUAL	100%		IQC	
1.4	Mounting locations	VISUAL	100%		IQC	
1.5	Crimping quality	VISUAL	At random		IQC	
1.6	Any physical damages	VISUAL	100%		IQC	
1.7	Completion of	VISUAL	At random		IQC	

1.8	Verification of applicable routine test certificates	VISUAL	100%		IQC	
2	FULLY ASSEMBLED AUXILIARY RELAYS					
2.1	Functional & calibration check , Drop –out test , Flag indication check , High voltage test 2kv for 1mnt , Check for secured arrangement of moving parts for transport.	Electrical / visual check.	100%	Test conformity	IQC	
3	FULLY ASSEMBLED STATIC RELAYS : CURRENT RELAYS, VOLTAGE RELAYS, TRIP CIRCUIT SUPERVISION RELAYS, TIMER RELAYS, FLASHER RELAYS, FUSE FAILURE RELAYS, AND ETC..					
3.1	Functional & calibration check , Drop –out test , Flag indication check , High voltage test 2kv for 1mnt , Check for secured arrangement of moving parts for transport.	Electrical / visual check.	100%	Test conformity	IQC	
4	PROTECTION RELAYS (conventional/numerical)					
4.1	Functional & calibration check , Drop –out test , Flag indication check , High voltage test 2.5kv for 1mnt , Check for secured arrangement of moving parts for transport.	Electrical / visual check.	100%	Test conformity	IQC	
5	RELAY TEST KITS					
5.1	Visual check, functional tests/IR value check	Electrical / visual check.	100%	Ass per specification & calibration	IQC	
5.2	Visual check all listed items as per BOM	Electrical / visual check.	100%	Ass per specification & calibration	IQC	
C	FINAL ACCEPTANCE & TESTING					
1	Preliminary acceptance testing					
1.1	FINAL ASSEMBLY					
A	Visual check for basic assembly and mimic diagram/ dimensional conformity	Visual dimensional conformity	100%		IQC	
B	Visual check for mounting of all equipment (approved makes)BOM check	Visual dimensional conformity	100%		IQC	
1.2	FINAL INSPECTION					
A	Dimensional report	measurement	100%	As per customer requirement	IQC	
B	Punching & bending inspection reports	measurement	100%	As per customer requirement	IQC	
1.3	SURFACE PREPARATION/ PRE-TREATMENT					
A	WEIGHT TEST REPORT	Functional check	At random		IQC	
B	Titration report	measurement	100%		IQC	
1.4	POWDER COATING/BREAKING		100%			
A	Surface finish	visual	100%	As per customer requirement	IQC	
B	Coating thickness	measurement	At random	As per customer requirement	IQC	
C	Powder shade	visual	100%	As per customer requirement	IQC	
d	Adhesion test report	Functional check	At random		Supplier test report	
E	Scratch test report	Functional check	At random		Supplier test report	
F	Bend test report	At random	At random		Supplier test report	
2	WIRING					
2.1	Cross section of wires/ cable ferruling/ crimping of lugs & wire crimping/ PVC channels / terminals.	Visual & physical checks	100%		IQC	

2.2	Verification of wiring/continuity tester	Visual Dimensional conformity testes	100%		IQC	
2.3	Check for earthing continuity between each apparatus and earth bus by continuity testers	Visual Dimensional conformity testes	100%		IQC	



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TUMKUR ROAD, BANGALORE-562123

CUSTOMER

VENDOR'S CODE:

ITEM:

CONTROL AND RELAY PANEL

SR.N O	COMPONENTS / OPERATIONS & DESCRIPTION OF Test.	TYPE OF CHECK	QUANTUM OF CHECK / SAMPLING WITH BASIS	ACCEPTANCE NORMS	REFERENCE DOCUMENT FOR TESTING	RESPONSIBILITY
3	FINAL ACCEPTANCE TESTES					
3.1	Operational, calibration check for protn relays test for all relays, meters, annunciation's etc ..	Visual checks & measurement /electrical functional checks	100%		IQC	IQC
3.2	Operational test (electrical control interlock & sequential operation)	Visual checks & measurement /electrical functional checks	100%	Test conformity	IQC	IQC
3.3	Current injection tests on all instruments/meters	Visual checks & measurement /electrical functional checks	100%	Test conformity	IQC	IQC
3.4	Annunciation sequence Annunciation inscription details	Visual checks & measurement /electrical functional checks	100%	Test conformity	IQC	IQC
3.5	The complete integration check for communication, relay configuration, parameterization, with interfacing of necessary software's/ hardware's printers (as applicable)	Visual checks & measurement /electrical functional checks	100%	Test conformity	IQC	IQC
3.6	IR value test (before & after HV test)	Visual checks & measurement /electrical functional checks	100%	Test conformity	IQC	IQC
3.7	High voltage test 2kv test for 1mnt between all terminals and earth- HV test.	Visual checks & measurement /electrical functional checks	100%	Test conformity	IQC	IQC
*samples for witnessing each type in case of T/U : T (75%), U(25%)AND IN CASE OF ONLY T: T (100%)						
D	PACKING AND DESPATCH				IQC	IQC
1	Verification of completeness of all items as per contract/ POWER GRID SPEC.				IQC	IQC
1.1	PRE-DESPATCH CHECKS Dressing, routing, bunching, &proper fastening all items Packing worthyness Identification marks on packed casing Despatch destination mark Strange instructions Enclose of applicable documents				IQC	IQC
1.2	Check for healthiness of packing/crates	visual	100%		IQC	IQC
1.3	Verification of CIP/MICC reference on packing crates.	visual	100%		IQC	IQC