

L&T Construction Power Transmission & Distribution Chennai - 600 089.	
The documents submitted are checked with respect to requirements of technical Specification. Deviations, if any, are highlighted with proper justification.	
Checked 	Verified by

			AMARARAJA	AMARARAJA	AMARARAJA
10-May-19	A	FOR APPROVAL	AMARARAJA	AMARARAJA	AMARARAJA
DATE	REV. NO.	DESCRIPTION	Designed	Checked	Approved

REVISIONS



CLIENT : TRANSMISSION CORPORATION OF ANDHRA PRADESH	CONSULTANT :
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PROJECT : 400/220kV GIS SUBSTATION AT THALLAYAPALEM FOR APTRANSCO, ANDHRAPRADESH

SUPPLIER / CONTRACTOR:
 L&T CONSTRUCTION, POWER TRANSMISSION & DISTRIBUTION

JOB No. O18165-E-IS

TOTAL NO. OF PAGES				TITLE :	
	NAME	SIGN	DATE	48V Battery Charger CUM DCDB - Type Test Report	
DSGN	AMARARAJA	AMARARAJA	10-May-19		
CHKD	AMARARAJA	AMARARAJA	10-May-19		
APPD	AMARARAJA	AMARARAJA	10-May-19		

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TYPE TEST PLAN/REPORTS FOR BATTERY CHARGER

Rating : 48V/160A FLOAT CUM BOOST CHARGER
(Suitable for 48V/1125AH VRLA-24 Cells)

Customer : EMCO Limited

Owner/Client : POWER GRID CORPORATION OF INDIA LIMITED

Project : 400/220kV Substation at Jaipur, Delhi road, Kotiputli

P.O. NO. : 4500125646, Date:01/10/13

LOA.NO : ----

S.O. NO. : PMUMS/000048/13-14


JOB NO : 13-1204

Date of Testing : 17/12/14

System Serial No. : 01131204000010101

17/12/14
INSPECTED BY *[Signature]* **APPROVED BY** *[Signature]* **VERIFIED BY** *[Signature]* **TESTED BY** *[Signature]*





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1.0 PHYSICAL CHECK

Sl.No.	General checks	Observation
1.	Workmanship, Finish and Paint Shade	OK/ NOT OK
2.	Proper Termination	OK/ NOT OK
3.	Door lock Functioning	OK/ NOT OK
4.	Wiring layout	OK/ NOT OK
5.	Component layout Fixing & accessibility	OK/ NOT OK
6.	Component Identification	OK/ NOT OK
7.	Bill of Material Check	OK/ NOT OK
8.	Panel Sheet Thickness	OK/ NOT OK
9.	Cable Entry gland plate	OK/ NOT OK

2.0 INSULATION RESISTANCE TEST

Insulation test is conducted with 500V megger.

- NOTE : 1. The above test is conducted without semiconductor device and PCBs.
2. The measured value should not be less than 5 mega Ohms.

Insulation Resistance Test between	Observed value	
	Before HV	After HV
A) AC Input to Earth	900M Ω	900M Ω
B) AC Input to DC Output	700M Ω	700M Ω
C) DC Output to Earth	700M Ω	700M Ω


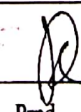

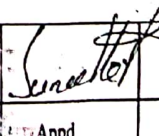
3.0 HIGH VOLTAGE (POWER FREQUENCY) TEST

Test Voltage : 2.5KVRMS for one minute

Note : The above test is conducted by shorting semi-conductor devices and PCB is disconnected from the circuit

High Voltage Test between	Specified Value/Limit	Observed
A) AC Input to Earth	To Withstand	With stood
B) AC Input to DC Output	To Withstand	With stood
C) DC Output to Earth	To Withstand	With stood

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4.0 PERFORMANCE TEST :

4.1 Float cum Boost Charger (In Boost mode)

Load Condition	AC Input Voltage (V1) (Volts)	Input Current (I1) (Amps)			Input power (W1) Watts	Output Voltage (V2) 55.2VDC	Output Current (I2) 160ADC	O/P Watts (W2) (V2xI2) Watts	Eff. % $\frac{W2 \times 100}{W1}$ Limit: 80%	Regulation $\pm 1\%$
		R	Y	B						
No load	373	1.5	1.4	1.5	-	55.2	0A	-	---	-
	415	1.9	1.8	2.3	-	55.2	0A	-	---	-
	457	3.1	2.4	2.7	-	55.2	0A	-	---	-
Half Load (50%)	373	9.1	9.0	9.3	-	54.9	80A	-	---	-
	415	9.8	9.7	10.4	-	54.9	80A	-	---	-
	457	10.4	10.6	11.3	-	55.0	80A	-	---	-
Full Load (100%)	373	17.2	16.9	17.6	-	54.9	160A	-	---	0.54%
	415	18.0	17.8	18.5	9.7kW	54.8	160A	8768W	90.3%	0.72%
	457	18.3	18.6	19.6	-	55.2	160A	-	---	-

4.2 RIPPLE MEASUREMENT TEST - (At Rated output voltage & current)

A) AC Input Voltage	415VAC
B) DC O/P Voltage	55.2VDC
C) DC O/P Current	160A DC
D) Required Ripple	Less than 1% RMS
E) Measured I/P Current	18.5
G) Measured Ripple	240mV

5.0 LOAD LIMITER OPERATION

AC INPUT VOLTAGE	BOOST MODE		
	OUTPUT VOLTAGE	OUTPUT CURRENT	ACTUAL
373 \pm 2V AC	55.0	112	112
	54.1	>112	>112
415 \pm 2V AC	55.1	112	112
	54.5	>112	>112
457 \pm 2V AC	55.1	112	112
	54.5	>112	>112

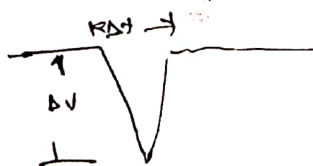
Note : Load Limiter will not allow charger to cross not more than $\pm 5\%$ of the set value at DC Output side.

6.0 DYNAMIC RESPONSE TEST

A) WITHOUT BATTERY

- Limits : i. Voltage Change : $\pm 6\%$
 ii. Time taken to reach steady state : within 2 seconds

- 1) For step change in load from 20% to 100%.



$$\Delta V = 625mV$$

$$\Delta t = 148ms$$

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2) For step change in load from 100% to 20%



$$\Delta V = 781 \text{ mV}$$

$$\Delta t = 216 \text{ ms}$$

7.0 TEMPERATURE RISE TEST

AC INPUT VOLTAGE: 415VAC

BOOST VOLTAGE : 55.2VDC

SYSTEM O/P CURRENT: 160ADC

TIME AT START : 8.00 A.M.

TIME AT FINISH : 4.00 P.M.

DATE : 17/12/14

DATE : 17/12/14

S.NO.	CONDITION		DURATION IN HOURS- Temperature in Deg.C							
			1	2	3	4	5	6	7	8
01.	AC INPUT VOLTS	R-Y	416	416	416	416	416	416	416	416
		B-Y	414	414	414	414	414	414	414	414
		B-R	417	417	417	417	417	417	417	417
02.	AC INPUT AMPS	R Ø	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
		B Ø	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8
		Y Ø	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5
03.	DC VOLTS		55.2	55.2	55.2	55.2	55.2	55.2	55.2	55.2
04.	DC AMPS		160	160	160	160	160	160	160	160
05.	AMBIENT TEMPERATURE		29	30	30	31	33	32	3	34
06.	CABINET INSIDE TEMP		30	32	34	36	39	40	41	41
07.	DC CHOKE (L 401)	COIL	58	64	71	73	77	83	85	85
		CORE	45	50	54	56	61	61	62	62
08.	INPUT TRANSFORMER (T-401) PRIMARY	COIL 1	60	77	87	90	93	95	97	97
		COIL 2	62	72	82	90	98	103	105	105
		COIL 3	65	76	86	89	95	100	103	103
	INPUT TRANSFORMER (T-401) SECONDARY	COIL 1	68	78	87	96	101	103	104	104
		COIL 2	61	71	78	84	90	94	93	93
		COIL 3	62	72	75	81	87	88	89	89
		CORE	50	57	65	69	78	83	85	85
09.	POWER SCR'S	SCR 401/404	65	67	74	80	85	87	89	89
		SCR 402/405	69	72	80	84	87	90	91	91
		SCR 403/406	73	78	85	90	92	93	94	94
10.	DC CAPACITOR	C 401	32	35	37	39	40	41	43	43
11.	BLOCKING DIODE	V 401	58	60	64	72	74	75	76	76

NOTES: Temperature rise of the Transformer, Choke should not exceed the limits given below.

Component	Maximum Temperature Rise Limit	Maximum Temperature Rise Observed
Transformer	90 °C above Ambient	71°C
Choke	90 °C above Ambient	51°C

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8.0 VISUAL INSPECTION

8.1 PROTECTIONS / INDICATORS / ALARMS

I. INDICATIONS [PILOT LAMPS]	INDICATION	ALARM	Remarks
a. AC Mains ON (R,Y,B)	OK	—	
b. Float ON	OK	—	
c. Boost ON	OK	—	
II. INDICATION [LED]			
a. AC Power Fail/Mains fail	OK	OK	
b. Charger Fuse Fail	OK	OK	
c. DC Over Voltage	OK	OK	
d. DC Under Voltage	OK	OK	
e. Battery over Voltage	OK	OK	
f. Battery temp. high	OK	OK	
III. PFC	OK/NOT OK		
a. Charger Trouble	OK	—	
b. Float ON	OK	—	
c. Boost ON	OK	—	

8.2 METERS CHECK

Sl.No.	METERS	RANGE	OBSERVATION
1.	AC VOLTMETER	0-500V AC	OK
2.	AC AMMETER	0-25A/5A AC	OK
3.	DC VOLTMETER	0-75V DC	OK
4.	DC AMMETER	0-250A/75mV DC	OK

8.3 SYSTEM SET POINTS

OBSERVED CONDITION	SET VALUE / LIMIT	OBSERVATION VALUE
a. Float Voltage	54V DC	54V
b. Boost Voltage	55.2V DC	55.2V
c. Over Voltage Cutback	56.4V DC	56.4V
d. Charger current Limit	168.0A DC	168.0A
e. Battery current Limit	112.5A DC	112.5A
f. Battery Over Voltage	55.92V DC	55.9V
g. DC Under Voltage	43.2V DC	43.2V
h. DC Over Voltage	56.16V DC	56.1V

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9.0 SHORT CIRCUIT TEST

The Short circuit Test should be conducted when Charger is delivering rated output current shorting should be made at the DC Output terminals.

Sl.No	Specified Value / Limit	Observations	
		No Load	Full Load
1	Charger should not trip	OK	OK
2	DC output MCCB should not trip	OK	OK
3	No Semiconductor fuse blow	OK	OK
4	AC input MCCB should not trip	OK	OK

Max. DC Output Current observed 168 A

10.0 DEGREE OF PROTECTION TEST (IP42)

Sl.No	CHECK	OBSERVATION	REMARKS
1	Steel wire of 1mm Diameter or paper with same size thickness shall not enter in to the enclosure.	OK	—
2	Drops of fall liquid 3 mm per minute shall have no harmful effect when the enclosure is fitted at any angle up to 15 deg. from the vertical in both plane.	OK	—

11.0 CHECKING OF TEMPERATURE COMPENSATION

Sl.No	CHECK	OBSERVATION	REMARKS
1	If temperature difference between Ambient to battery is 6-7 deg C then battery temperature high indication will come with alarm.	✓ OK / NOT OK	—
2	For every 1 deg C rise in temperature above 27 deg C at battery then charging voltage will decrease 3mV/cell i.e., 3.3V will decrease per 10 deg C rise in temperature.	✓ OK / NOT OK	—

SL NO	TEST EQUIPMENTS USED	SERIAL NO
1	Multimeter	5THM075
2	Power analyzer	DM9770075
3	megger	5TH6008
4	H.V Tester	5THV001

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