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भारत सरकार, रक्षा मंत्रालय,
Government of India, Ministry of Defence,
रक्षा अनुसंधान तथा विकास स्थापन,
Defence Research & Development Organisation,
अनुसंधान तथा विकास स्थापन (इंजीनियर्स),
Research & Development Establishment
(Engineers),
कलस, आलंदी रोड, दिघी पो.ऑ., पुणे - 411015, भारत
Kalas, Alandi Road, Dighi P.O., Pune-411 015,
INDIA

ENVIRONMENTAL TEST REPORT

Job No. : RE 08 RQ [] 09
Test Report No. : 061109 Date : 07 Jan' 2010
1) Reference No. : i) EUPL-L/R&DE/09-10/A0146 dtd. 14 Oct' 2009
2) Name of sample/ Equipment : 20 kVA, UPS, 3 Phase, I/P & single phase O/P, Type: Floor Mounted, Model - True On Line. UPS Sr.No.200907130.
3) Name of Mfg./ Supplier/ Group : M/s Eertech UPS Pvt. Ltd, Pune
4) Type of test : **Environmental Testing**
1) Dry Heat Test : 16 hrs Soaking at + 55° C as per IS:9000
Test No.'B' part. 3 / sec. 5
2) Damp Heat Test: 40° C, 2 cycles (12+12Hrs), (each cycle of 24Hrs) as per IS:9000, Test No.'D' part. 5 / sec. 2
3) Cold Test: -10 ° C for 4 hrs soaking, as per IS:9000, Test No.'A' part. 2 / sec.4
5) Specification followed : As per IS: 9000 and customer requirement
6) Test conducted by : 1) Shri PK Dey, TO'C' - R&DE
: 2) Shri N Kundu, TO'B' - R&DE
: 3) Shri BP Kamble, Tech 'C' - R&DE
7) Test witness by : 1) Shri.MA SAJJAN, Chief Executive Officer - M/s.Enertech,Pune
8) Test result : Enclosed as appendixes 'A', 'B', 'C' & 'D' (Total 8 Pages)
9) Instruments used : (a) Digital/ Storage CRO, Serial No.54600B, Due on 31/ 12/2009
(b) H.V. Tester, Sr.No.970502, Due on 21/02/2010
(c) Megger, Sr. No.2026303, Due on 27/02/2010
(d) Digital Multimeter, Sr.No.0740641, Due on 27/01/2010
(e) Fluke F-41 B, Sr.No. 6962023, due on 27/01/2010

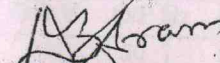
PREPARED BY


(PK DEY)
Technical Officer 'C'
Job Execution Officer.

APPROVED BY


(JK BISWAS)
Scientist 'E'
Head (R&QA)

ISSUE AUTHORISED BY


(DB PEDRAM)
Scientist 'F'
Gp. Director (R&QA)

Distribution :

- | | |
|-------------------------------------|------------|
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 अनुसंधान तथा विकास स्थापन (इंजीनियर्स),
 Research & Development Establishment (Engineers),
 कलस, आलंदी रोड, दिगी पो.ऑ., पुणे - 411015, भारत
 Kalas, Alandi Road, Dighi P.O., Pune-411 015, INDIA

ENVIRONMENTAL TEST REPORT

Job No. RE 08 RQ 09
 TR No. 061109 Dtd: 07/01/2010

Appendix 'A'

Equipment under test : 20 kVA UPS 3 Phase 400 VAC I/P & 1 Phase 230 VAC OUTPUT
 UPS Sr. No: 200907130, Model: True ON Line. Device Used: IGBT,
 Cabinet: IP - 2L1, Type: Floor Mounted with Isolation transformer.

DRY HEAT TEST: (Date of Commencement : 24/11/09 & Date of Completion : 25/11/09)
 Conducted in accordance with IS 9000 (Part 3/Sec.5) 1977 (reaffirmed 2004) at +55 ° C for 16 hrs.

PRE TEST : Following parameters checked before conducting the environmental tests of Dry heat condition simulation in the chamber :

Srl. No.	TEST PARAMETER	TEST CONDITIONS	REQUIREMENT	Observation	Remark												
1.	Visual Examination -		a. UPS Shall be free from workmanship defects, sharp edges, nicks, scratches, burs, etc. All fasteners shall be fixed properly. The equipment shall be complete with all parts and all parts shall be functional. Physically UPS should be verified. b. Enclosure shall confirm to protection requirement of IP2L1 c. By-pass facility shall be provided for maintenance of UPS. Physically manual bypass switch shall be verified	Overall Physical condition of the UPS checked and found to be Ok. It has been verified that Enclosure conforms to IP2L1 Manual Bypass switch 100A, 2 pole 2 way Salzer make provided on Front door	- - -												
2.	UPS supply O/P power, charger current & O/P frequency at the same time	Connect 3 ph 400VAC, 50Hz at UPS I/P. Connect 20kVA load at UPS O/P. Connect batteries. Check charging current & O/P frequency	The UPS shall supply O/P Power & charging current at the same time and O/P freq. shall be measured.	Charging current = 13A O/P Freq. = 50 Hz	- -												
3.	Input voltage variation Test. (voltage regulation Test)	Connect 3ph 400VAC, 50Hz at UPS I/P. Connect 20 kVA load at UPS O/P, Vary the input voltage from 300 VAC to 450V AC & Check the output voltage on full load. At Input frequency 50Hz \pm 3%	Output shall be 230V; 1ph +/- 1% & O/P frequency shall be 50 Hz +/- 0.5 Hz (with alternative setting for 220 V +/- 1%)	<table border="1"> <thead> <tr> <th>I/P V</th> <th>O/P V</th> <th>O/P Hz</th> </tr> </thead> <tbody> <tr> <td>300</td> <td>231</td> <td>50</td> </tr> <tr> <td>400</td> <td>230</td> <td>50</td> </tr> <tr> <td>450</td> <td>230</td> <td>50</td> </tr> </tbody> </table>	I/P V	O/P V	O/P Hz	300	231	50	400	230	50	450	230	50	- -
I/P V	O/P V	O/P Hz															
300	231	50															
400	230	50															
450	230	50															



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 P. K. Dey Tech. Officer 'C'

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 Research & Development Establishment (Engineers),
 कलस, आलंदी रोड, दिघी पो.ऑ., पुणे - 411015, भारत
 Kalas, Alandi Road, Dighi P.O., Pune-411 015, INDIA

Appendix 'A' (Annex-I)

ENVIRONMENTAL TEST REPORT (DRY HEAT TEST)

Job No. RE 08 RQ[] 09

TR No. 061109 Dtd: 07/ 01/ 2010

Equipment under test : 20 kVA UPS 3 Phase 400 VAC I/P & 1 Phase 230 VAC OUTPUT

UPS Sr. No: 200907130 , Model: True ON Line. Device Used: IGBT,
 Cabinet: IP - 2L1, Type: Floor Mounted with Isolation transformer.

Test Chamber: Dry heat Chamber, Size : 2m x 1m x 1m.

Test Condition : Ambient temp . was raised to +55 °C temp in 2 hrs. Soaking period 16 hrs.

Date of Commencement: 24/11/09 at 1600 Hrs. & Date of Completion : 25/11/09 at 10 00 Hrs

INSET PERFORMANCE TEST (IN THE CHAMBER at +55 °C)

Performance of the UPS was observed during last half an hour of soaking at dry heat condition.

Srl. No.	TEST PARAMETER	TEST CONDITIONS	REQUIREMENT	Observation	Remark												
1.	Visual Examination -		a. UPS Shall be free from workmanship defects, sharp edges, nicks, scratches, burs, etc. All fasteners shall be fixed properly. The equipment shall be complete with all parts and all parts shall be functional. Physically UPS should be verified. b. Enclosure shall confirm to protection requirement of IP2L1 c. By-pass facility shall be provided for maintenance of UPS. Physically manual bypass switch shall be verified	Overall Physical condition of the UPS checked and found to be Ok. It has been verified that Enclosure conforms to IP2L1 Manual Bypass switch 100A, 2 pole 2 way Salzer make provided on Front door	-												
2.	UPS supply O/P power, charger current & O/P frequency at the same time	Connect 3 ph 400VAC, 50Hz at UPS I/P. Connect 20kVA load at UPS O/P. Connect batteries. Check charging current & O/P frequency	The UPS shall supply O/P Power & charging current at the same time and O/P freq. shall be measured.	Charging current = 13A O/P Freq. = 50 Hz	-												
3.	Input voltage variation Test. (voltage regulation Test)	Connect 3ph 400VAC, 50Hz at UPS I/P. Connect 20 kVA load at UPS O/P, Vary the input voltage from 300 VAC to 450V AC & Check the output voltage on full load. At Input frequency 50Hz +/- 3%	Output shall be 230V; Iph +/- 1% & O/P frequency shall be 50 Hz +/- 0.5 Hz (with alternative setting for 220 V +/- 1%)	<table border="1"> <thead> <tr> <th>I/P V</th> <th>O/P V</th> <th>O/P Hz</th> </tr> </thead> <tbody> <tr> <td>300</td> <td>231</td> <td>50</td> </tr> <tr> <td>400</td> <td>230</td> <td>50</td> </tr> <tr> <td>450</td> <td>230</td> <td>50</td> </tr> </tbody> </table>	I/P V	O/P V	O/P Hz	300	231	50	400	230	50	450	230	50	-
I/P V	O/P V	O/P Hz															
300	231	50															
400	230	50															
450	230	50															



[Signature]
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 Research & Development Establishment (Engineers),
 कलस, आलंदी रोड, दिघी पो.ऑ., पुणे - 411015, भारत
 Kalas, Alandi Road, Dighi P.O., Pune-411 015, INDIA

ENVIRONMENTAL TEST REPORT (DAMP HEAT TEST)

Appendix 'B'

Job No. RE 08 RQJ 09
 TR No. 061109 Dtd: 07/ 01/ 2010

Equipment under test : 20 kVA UPS 3 Phase 400 VAC I/P & 1 Phase 230 VAC O/P
 UPS Sr. No: 200907130, Model: True ON Line. Device Used: IGBT,
 Cabinet: IP - 2L1, Type: Floor Mounted with Isolation transformer.

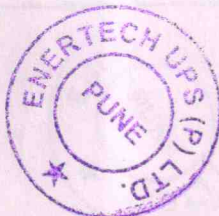
DAMP HEAT TEST: Conducted in accordance with IS 9000 (Part 5/Sec.2) 1981 (reaffirmed 2004) at Temperature of 40 degree C. Two cycles. (12 + 12 hours).

Date of Commencement: 25/11/09 at 1030 hrs

Date of Completion : 27/11/09 at 1500 hrs

PRE TEST : Following parameters checked before conducting the environmental tests of Damp heat condition simulation in the chamber :

Srl. No.	TEST PARAMETER	TEST CONDITIONS	REQUIREMENT	Observation	Remark												
1.	Visual Examination -		a. UPS Shall be free from workmanship defects, sharp edges, nicks, scratches, burs, etc. All fasteners shall be fixed properly. The equipment shall be complete with all parts and all parts shall be functional. Physically UPS should be verified. b. Enclosure shall confirm to protection requirement of IP2L1 c. By-pass facility shall be provided for maintenance of UPS Physically manual bypass switch shall be verified	Physically UPS verified found ok It has been verified that Enclosure confirms to IP2L1 Manual Bypass switch 100A, Two pole two way Salzer make provided on Front door	- - -												
2.	UPS supply O/P power, charger current & O/P frequency at the same time	Connect 3 ph 400VAC, 50Hz AT UPS I/P. Connect 20kVA load at UPS O/P. Connect batteries. Check charging current & O/P frequency.	The UPS shall supply O/P Power & charging current at The same time and O/P freq. Shall be measured.	O/P Power = 16.2 kW Charging current = 2A O/P Frequency = 50 Hz	-												
3.	Input voltage variation Test (voltage regulation)	Connect 3ph 400VAC, 50HZ at UPS I/P. Connect 20kVA load at UPS O/P, Vary the input voltage from 300 VAC to 450V AC & Check the output voltage on full load at Input frequency 50Hz \pm 3%	Output shall be 230; 1ph +/- 1% & O/P frequency shall be 50 Hz +/- 0.5 Hz (with alternative setting for 220 V +/- 1%)	<table border="1"> <thead> <tr> <th>I/P V</th> <th>O/P V</th> <th>O/P Hz</th> </tr> </thead> <tbody> <tr> <td>300</td> <td>228</td> <td>50</td> </tr> <tr> <td>400</td> <td>228</td> <td>50</td> </tr> <tr> <td>450</td> <td>230</td> <td>50</td> </tr> </tbody> </table> Alternative setting for 220VAC provided.	I/P V	O/P V	O/P Hz	300	228	50	400	228	50	450	230	50	-
I/P V	O/P V	O/P Hz															
300	228	50															
400	228	50															
450	230	50															



-3-

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 Research & Development Establishment (Engineers),
 कलस, आलंदी रोड, दिची पो.ऑ., पुणे - 411015, भारत

ENVIRONMENTAL TEST REPORT

Appendix 'B' (Annex-I)

Job No. RE 08 RQ[] 09

TR No. 061109 Dtd: 07/ 01/ 2010

Equipment under test : 20 kVA UPS 3 Phase 400 VAC I/P & 1 Phase 230 VAC O/P

UPS Sr. No: 200907130, Model: True ON Line. Device Used: IGBT,

Cabinet: IP - 2L1, Type: Floor Mounted with Isolation transformer.

DAMP HEAT TEST : Temp Cyclic test.

Test Chamber: Damp heat Chamber, Size : 2m x 1m x 1m.

Test Condition : 25°C to 40 °C for 3 hrs., at 40 °C for 16 hrs, 40 °C to 25°C for 3 hrs and at 25°C for 3 hrs with 95% RH.

Date of Commencement: 25/11/09 at 1030 hrs

Date of Completion : 27/11/09 at 1500 hrs

INSET (IN THE CHAMBER) Performance observed during last half an hour of the cycle

Srl. No.	TEST PARAMETER	TEST CONDITIONS	REQUIREMENT	Observation	Remark																
1.	Visual Examination -		<p>a. UPS Shall be free from workmanship defects, sharp edges, nicks, scratches, burs, etc. All fasteners shall be fixed properly. The equipment shall be complete with all parts and all parts shall be functional. Physically UPS should be verified.</p> <p>b. Enclosure shall confirm to protection requirement of IP2L1 By-pass facility shall be provided for maintenance of UPS.</p>	<p>Physically UPS has been verified and Found ok</p> <p>It has been verified that enclosure confirms to IP2L1) Physically manual bypass switch has been verified 100A Salzer make 2 pole, 2way rotary switch has been provided</p>	-																
2.	UPS Supply O/P power charger, current & O/P frequency at the same time	Connect 3 ph 400VAC, 50Hz AT UPS I/P. Connect 20kVA load at UPS O/P. Connect batteries. Check charging current & O/P frequency.	The UPS shall supply O/P Power & charging current at the same time and O/P freq. Shall be measured. Output frequency shall be same as Input frequency in synch mode.	<p>O/P Power-20kVA/16 kW</p> <p>Charging Current - 5A</p> <p>O/P Frequency - 50 Hz</p> <p>I/P Frequency - 50 Hz</p>	-																
3.	Input voltage variation Test (voltage regulation)	Connect 3ph 400VAC, 50HZ at UPS I/P. Connect 20kVA load at UPS O/P. Vary the input voltage from 300 VAC to 450V AC & Check the output voltage on full load at Input frequency 50Hz ± 3%	Output shall be 230V +/- 1% O/P frequency shall be 50Hz +/- 0.5Hz at input frequency 50Hz ± 3%	<table border="1"> <thead> <tr> <th>Time</th> <th>I/P V</th> <th>O/P V</th> <th>O/P Hz</th> </tr> </thead> <tbody> <tr> <td>1400</td> <td>300</td> <td>229</td> <td>50</td> </tr> <tr> <td>1415</td> <td>400</td> <td>229</td> <td>50</td> </tr> <tr> <td>1430</td> <td>450</td> <td>231</td> <td>50</td> </tr> </tbody> </table>	Time	I/P V	O/P V	O/P Hz	1400	300	229	50	1415	400	229	50	1430	450	231	50	-
Time	I/P V	O/P V	O/P Hz																		
1400	300	229	50																		
1415	400	229	50																		
1430	450	231	50																		



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Appendix 'C'

ENVIRONMENTAL TEST REPORT (COLD TEST)

Job No. RE 08 RQ|| 09

TR No. 061109 Dtd: 07/ 01/ 2010

Equipment under test : 20 kVA UPS 3 Phase 400 VAC I/P & 1 Phase 230 VAC O/P

UPS Sr. No: 200907130, Model: True ON Line. Device Used: IGBT,
 Cabinet: IP - 2L1, Type: Floor Mounted with Isolation transformer.

COLD TEST: Conducted in accordance with IS 9000 (Part 2 /Sec.4) 1977 (reaffirmed 2004)
 at -10 degree C. for 4 hrs.

Date of Commencement : 02/12/09 at 0900 hrs

Date of Completion : 02/12/09 at 1700 hrs

PRE TEST : Following parameters checked before conducting the environmental tests of low temp condition simulation in the chamber :

Srl. No.	TEST PARAMETER	TEST CONDITIONS	REQUIREMENT	Observation	Remark
1.	Visual Examination -		a. UPS Shall be free from workmanship defects, sharp edges, nicks, scratches, burs, etc. All fasteners shall be fixed properly. The equipment shall be complete with all parts and all parts shall be functional. Physically UPS should be verified. b. Enclosure shall confirm to protection requirement of IP2L1 c. By-pass facility shall be provided for maintenance of UPS Physically manual bypass switch shall be verified	Physically UPS verified found ok It has been verified that Enclosure confirms to IP2L1 Manual Bypass switch 100A, Two pole two way Salzer make provided on Front door.	- - -
2.	UPS supply O/P power, charger current & O/P frequency at the same time	Connect 3 ph 400VAC, 50Hz AT UPS I/P. Connect 20kVA load at UPS O/P. Connect batteries. Check charging current & O/P frequency.	The UPS shall supply O/P Power & charging current at The same time and O/P freq. Shall be measured. UPS shall also have synchronous mode in which output frequency will equal input frequency.	O/P Power = 16.2 kW Charging current = 2A O/P Frequency = 50 Hz I/P Frequency = 49.90 Hz O/P Frequency = 49.90 Hz	-

3.	Input voltage variation Test. (voltage regulation)	Connected 3ph 400VAC, 50HZ at UPS I/P. Connected 20 kVA load at UPS O/P, Varied the input voltage from 300 VAC to 450V AC & Checked the output voltage on full load at Input frequency 50Hz ± 3%	Output shall be 230; 1ph +/- 1% & O/P frequency shall be 50 Hz +/- 0.5 Hz (with alternative setting for 220 V +/- 1%)	Time	I/P V	O/PV	O/PHz	
				1200	300	228	50	
				1215	400	228	50	
				1230	450	230	50	
				Alternative setting for 220VAC provided.				

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ENVIRONMENTAL TEST REPORT

Appendix 'C' (Annex-I)

Job No. RE 08 RQ[] 09
 TR No. 061109 Dtd: 07/ 01/ 2010

Equipment under test : 20 kVA UPS 3 Phase 400 VAC I/P & 1 Phase 230 VAC O/P
 UPS Sr. No: 200907130, Model: True ON Line. Device Used: IGBT,
 Cabinet: IP - 2L1, Type: Floor Mounted with Isolation transformer.

COLD TEST: Conducted in accordance with IS 9000 (Part 2 /Sec.4) 1977 (reaffirmed 2004)
 at -10 degree C. for 4 hrs.

Test Chamber: Cold Chamber, Size: 1 m x 1m x 1m
 Test Condition: Ambient Temp. was reduced to - 10 °C in 3 hrs, soaking period for 4 hrs.
 Date of Commencement : 02/12/09 at 0900 hrs
 Date of Completion : 02/12/09 at 1600 hrs

INSET (IN THE CHAMBER) Performance observed during last half an hour

Srl. No.	TEST PARAMETER	TEST CONDITIONS	REQUIREMENT	Observation	Remark															
1.	Visual Examination -		a. UPS Shall be free from workmanship defects, sharp edges, nicks, scratches, burs, etc. All fasteners shall be fixed properly. The equipment shall be complete with all parts and all parts shall be functional. Physically UPS should be verified. b. Enclosure shall confirm to protection requirement of IP2L1 c. By-pass facility shall be provided for maintenance of UPS.	Physically UPS has been verified and Found ok It has been verified that enclosure confirms to IP2L1 Physically manual bypass switch has been verified 100A Salzer make 2 pole, 2 way rotary switch has been provided	-															
2.	UPS Supply O/P power charger, current & O/P frequency at the same time	Connect 3 ph 400VAC, 50Hz AT UPS I/P. Connect 20kVA load at UPS O/P. Connect batteries. Check charging current & O/P frequency.	The UPS shall supply O/P Power & charging current at the same time and O/P freq. Shall be measured. Output frequency shall be same as Input frequency in synch mode.	O/P Power-20kVA/16.2 kW Charging Current - 10A O/P Frequency - 50 Hz I/P Frequency - 50 Hz	-															
3.	Input voltage variation Test (voltage regulation)	Connect 3ph 400VAC, 50HZ at UPS I/P. Connect 20 kVA load at UPS O/P, Vary the input voltage from 300 VAC to 450V AC & Check the output voltage on full load at Input frequency 50Hz ± 3%	Output shall be 230V +/- 1% O/P frequency shall be 50Hz +/- 0.5Hz at input frequency 50Hz ± 3%	<table border="1"> <thead> <tr> <th>I/P</th> <th>O/P</th> <th>O/P</th> </tr> <tr> <th>V</th> <th>V</th> <th>Hz</th> </tr> </thead> <tbody> <tr> <td>300</td> <td>229</td> <td>50</td> </tr> <tr> <td>400</td> <td>229</td> <td>50</td> </tr> <tr> <td>450</td> <td>230</td> <td>50</td> </tr> </tbody> </table>	I/P	O/P	O/P	V	V	Hz	300	229	50	400	229	50	450	230	50	-
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V	V	Hz																		
300	229	50																		
400	229	50																		
450	230	50																		



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ENVIRONMENTAL TEST REPORT

Appendix 'D'

Job No. RE 08 RQ|| 09
 TR No. 061109 Dtd: 07/ 01/ 2010

Equipment under test : 20 kVA UPS 3 Phase 400 VAC I/P & 1 Phase 230 VAC O/P
 UPS Sr. No: 200907130, Model: True ON Line. Device Used: IGBT,
 Cabinet: IP - 2L1, Type: Floor Mounted with Isolation transformer.

POST TEST: After completion of the Environmental test s sequence of the three environmental conditions i.e Dry heat , Damp heat & Cold temp and recovery period of one and half hrs, the following test wear carried out.

Date of Commencement: 02/12/09 at 1730 hrs
 Date of Completion : 02/12/09 at 1900 hrs

POST TEST REPORT

Srl. No.	TEST PARAMETER	TEST CONDITIONS	REQUIREMENT	Observation	Remark
1.	Visual Examination -		a. UPS Shall be free from workmanship defects, sharp edges, nicks, scratches, burs, etc. All fasteners shall be fixed properly. The equipment shall be complete with all parts and all parts shall be functional. Physically UPS should be verified. b. Enclosure shall confirm the protection requirement of IP2L1 c. By-pass facility shall be provided for maintenance of UPS Physically manual bypass switch shall be verified	Physically UPS verified found ok It has been verified that Enclosure confirms to IP2L1 Manual Bypass switch 100A, Two pole two way Salzer make provided On Front door	- - -
2.	UPS supply O/P power, charger current & O/P frequency at the same time	Connected 3 ph 400VAC, 50Hz AT UPS I/P. Connected 20kVA load at UPS O/P. Connected batteries. Checked charging current & O/P frequency.	The UPS shall supply O/P Power & charging current at The same time and O/P freq. Shall be measured. UPS shall also have synchronous mode in which output frequency will equal input frequency.	O/P Power = 16.1 kW Charging current = 15A O/P Frequency = 50 Hz I/P Frequency = 50 Hz O/P Frequency = 50 Hz	-

- 7-

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Job No. RE 08 RQ|| 09
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Appendix 'D'

Equipment under test : 20 kVA UPS 3 Phase 400 VAC I/P & 1 Phase 230 VAC O/P
 UPS Sr. No: 200907130, Model: True ON Line. Device Used: IGBT,
 Cabinet: IP - 2L1, Type: Floor Mounted with Isolation transformer.

Continuation of environmental post test performance tests

3.	Input voltage variation Test. (voltage regulation)	Connected 3ph 400VAC, 50HZ at UPS I/P. Connected 20 kVA load at UPS O/P, Varied the input voltage from 300 VAC to 450V AC & Checked the output voltage on full load at Input frequency 50Hz \pm 3%	Output shall be 230; Iph +/- 1% & O/P frequency shall be 50 Hz +/- 0.5 Hz (with alternative setting for 220 V +/- 1%)	<table border="1"> <thead> <tr> <th>Time</th> <th>I/P V</th> <th>O/P V</th> <th>O/PHz</th> </tr> </thead> <tbody> <tr> <td>1530</td> <td>300</td> <td>228</td> <td>50</td> </tr> <tr> <td>1540</td> <td>400</td> <td>228</td> <td>50</td> </tr> <tr> <td>1550</td> <td>450</td> <td>228</td> <td>50</td> </tr> </tbody> </table> <p>Alternative setting for 220VAC provided.</p>	Time	I/P V	O/P V	O/PHz	1530	300	228	50	1540	400	228	50	1550	450	228	50	
Time	I/P V	O/P V	O/PHz																		
1530	300	228	50																		
1540	400	228	50																		
1550	450	228	50																		
4.	Total harmonic distortion.	Connected 3 ph 400VAC 50Hz at UPS I/P. Connected 20 kVA load at UPS O/P. Checked O/P THD.	THD shall be \leq 3% for Input Harmonics \leq 10%	O/P THD = 2.6% I/P Harmonics = 7.5%																	
5.	Overall Efficiency	Connected 3 ph 400VAC 50Hz at UPS I/P. Connected 20 kVA load at UPS O/P. Checked Overall efficiency at rated O/P voltage and frequency.	Overall efficiency shall be $>$ 90% at rated O/P voltage & frequency.	O/P kW = 16.2 I/p kW = 17.7 Effeciency = O/P kW / I/P kW = 91.5%																	
6.	Over shoot, under shoot, limits and over voltage protection.	Connected 3 ph 400VAC 50Hz at UPS I/P. Connected 20 kVA load at UPS O/P. Switched ON/OFF 100% load and checked over shoot/ under shoot and recovery	Over shoot/ under shoot shall not be greater than 4% of rated voltage for duration of 40 millisecc max.	Voltage Nominal - 7.69 V, Voltage Overshoot - 7.99 V Voltage Undershoot - 7.54 V-- Overshoot Recovery - 40 msecds Undershoot Recovery - 35 msecds V Overshoot % - 3.90% V Undershoot % - 1.90%																	
7.	Insulation resistance, leakage current, high voltage as per IS616/86 (reaffirmed 1991)	Shorted I/P terminals O/P terminals and battery terminals. Measured Insulation Resistance between these terminals and body, HV at 2 kVAC Tested for one minute and leakage current observed.	Insulation resistance shall be $>$ 100 mega ohms. HV at 2KVAC for one minute. Leakage current \leq 5mA The system shall work without any break down all above test.	IR observed = 100 mega ohm as per the Test Condition. HV at 2 kV AC for one minute found ok. Leakage current observed = 4.5 mA The system has worked without any breakdown after HV & IR Test																	
8.	Verification of VAH and backup time.	Disconnected I/P supply to UPS. Connected full load 20kVA at UPS O/P and checked backup time.	The backup time shall be 240 mts. VAH shall be $>$ 128000 Battery used 12 volt 100AH x 108 Nos. SMF Amarraja/ VRLA/ Okaya	Backup time Observed = 240mts Actual VAH Supplied = 129600 Make of battery: Okaya	Battery Bank initial Voltage - 400VDC At the end of Backup time, battery bank voltage observed was - 291 VDC																

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