MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*
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Test Report

For the

Wasion Group Limited
Libra Meters

Tested under

ANSI C12.1 and ANSI C12.20

MET Report: EMC & TEL27839-ANSI

April 6, 2010

Prepared for:

Wasion Group Limited
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ANSI C12.1-2001 for Electric Meters, Code for Electricity Meters and C12.20-2002 for Electricity Meters - 0.2 and 0.5 Accuracy Classes

MET Report: EMC & TEL27839-ANSI

Francis Chau
Electromagnetic Compatibility Lab

William Murphy
Telecommunications Lab

Roseline Onyeagwu
Documentation Department

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be **within** the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested **is** capable of operation in accordance with the requirements of the customer supplied test plan.

John Mason, Manager
Electromagnetic Compatibility Lab

Jim Reed, Manager
Telecommunications Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	April 6, 2010	Initial Issue.

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List of Terms and Abbreviations

AC	**A**lternating **C**urrent
ACF	**A**ntenna **C**orrection **F**actor
Cal	**C**alibration
d	Measurement Distance
dB	**d**eci**B**els
dBµA	**d**eci**B**els above one **micro A**mp
dBµV	**d**eci**B**els above one **micro V**olt
dBµA/m	**d**eci**B**els above one **micro A**mp per **m**eter
dBµV/m	**d**eci**B**els above one **micro V**olt per **m**eter
DC	**D**irect **C**urrent
E	Electric Field
DSL	**D**igital **S**ubscriber **L**ine
ESD	**E**lectro**s**tatic **D**ischarge
EUT	**E**quipment **U**nder **T**est
f	Frequency
GRP	**G**round **R**eference **P**lane
H	Magnetic Field
HCP	**H**orizontal **C**oupling **P**lane
Hz	**H**ert**z**
IEC	**I**nternational **E**lectrotechnical **C**ommission
kHz	**kilo H**ert**z**
kPa	**kilo P**ascal
kV	**kilo V**olt
LISN	**L**ine **I**mpedance **S**tabilization **N**etwork
MHz	**M**ega **H**ert**z**
µH	**micro H**enry
µF	**micro**farad
µs	**micro s**econds
PRF	**P**ulse **R**epetition **F**requency
RF	**R**adio **F**requency
RMS	**R**oot-**M**ean-**S**quare
TWT	**T**raveling **W**ave **T**ube
V/m	**V**olts per **m**eter
VCP	**V**ertical **C**oupling **P**lane

1.0 Requirement Summary

An evaluation to determine compliance of the Wasion Group Limited Libra Meters was performed on a sample of the equipment for the purpose of demonstrating compliance with ANSI C12.1-2001 for Electric Meters, Code for Electricity Meters and C12.20-2002 for Electricity Meters - 0.2 and 0.5 Accuracy Classes.

Conformance																		
Test Description	**Form 2S, SN10282 CL200 240VAC**	**Form 2S, SN10283 CL200 240VAC**	**Form 2S, SN10285 CL200 240VAC**	**Form 2S, SN10268 CL200 240VAC**	**Form 2S, SN10270 CL200 240VAC**	**Form 2S, SN10275 CL200 240VAC**	**Form 2S, SN10293 CL200 240VAC**	**Form 2S, SN10294 CL200 240VAC**	**Form 2S, SN10295 CL200 240VAC**	**Form 2S, SN10286 CL200 240VAC**	**Form 2S, SN10284 CL200 240VAC**	**Form 2S, SN10287 CL200 240VAC**	**Form 2S, SN10296 CL200 240VAC**	**Form 2S, SN10297 CL200 240VAC**	**Form 2S, SN10298CL200 240VAC**	**Form 2S, SN10271 CL200 240VAC**	**Form 2S, SN10280 CL200 240VAC**	**Form 2S, SN10279CL200 240VAC**
Performance Verification	C	C	C							C	C	C	C	C	C			
Test No. 1: No Load										C	C	C						
Test No. 2: Starting Load										C	C	C						
Test No. 3: Load Performance										C	C	C						
Test No. 4: Effect of Variation of Power Factor										C	C	C						
Test No. 5: Effect of Variation of Voltage										C	C	C						
Test No. 6: Effect of Variation of Frequency										C	C	C						
Test No. 7: Equality of Current Circuits										C	C	C						
Test No. 8: Internal Meter Losses													C	C	C			
Test No. 9: Temperature Rise				C		C										C		
Test No. 10: Register Friction	N/A																	
Test No. 11: Effect of Internal Heating																C	C	C
Test No. 12: Effect of Tilt	N/A																	
Test No. 13: Stability of Performance				C		C										C		
Test No. 14: Effect of Polyphase Loading	N/A																	
Test No. 15: Insulation	C	C	C	C	C	C												
Test No. 16: Voltage Interruptions Test	C	C	C	C	C	C												
Test No. 17: Effect of High Voltage Line Surges		C	C	C	C	C												
Test No. 18: Effect of External Magnetic Field							C	C	C									
Test No. 19: Effect of Variation of Ambient Temperature													C	C	C			
Test No. 20: Effect of Temporary Overloads				C		C										C		

Conformance																		
Test Description	**Form 2S, SN10282 CL200 240VAC**	**Form 2S, SN10283 CL200 240VAC**	**Form 2S, SN10285 CL200 240VAC**	**Form 2S, SN10268 CL200 240VAC**	**Form 2S, SN10270 CL200 240VAC**	**Form 2S, SN10275 CL200 240VAC**	**Form 2S, SN10293 CL200 240VAC**	**Form 2S, SN10294 CL200 240VAC**	**Form 2S, SN10295 CL200 240VAC**	**Form 2S, SN10286 CL200 240VAC**	**Form 2S, SN10284 CL200 240VAC**	**Form 2S, SN10287 CL200 240VAC**	**Form 2S, SN10296 CL200 240VAC**	**Form 2S, SN10297 CL200 240VAC**	**Form 2S, SN10298CL200 240VAC**	**Form 2S, SN10271 CL200 240VAC**	**Form 2S, SN10280 CL200 240VAC**	**Form 2S, SN10279CL200 240VAC**
Test No. 21: Effect of Current Surge in Ground Conductor							C	C	C									
Test No. 23: Effect of Voltage Variation/Secondary	N/A																	
Test No. 24: Effect of Ambient Temperature/Secondary	N/A																	
Test No. 25: Electrical Fast Transient/Burst				C	C	C												
Test# 25a Effect of Electrical - Oscillatory SWC				C	C	C												
Test No. 26: Effect of Radio Frequency Interference							C	C	C									
Test No. 27: Radio Frequency Conducted Emissions				C	C	C												
Test No. 27: Radio Frequency Radiated Emissions	C	C	C															
Test No. 28: Effects of Electrostatic Discharge				C	C	C												
Test No. 29: Effect of Storage Temperature	N/A																	
Test No. 30: Effect of Operating Temperature				C	C	C												
Test No. 31: Effect of Relative Humidity				C	C	C												
Test No. 32: Mechanical Shock																C	C	C
Test No. 33: Transportation Drop													C	C	C	C	C	C
Test No. 34: MechanicalVibration																C	C	C
Test No. 35: Transportation Vibration																C	C	C
Test No. 36: Weather Simulation Test													C	C	C			
Test No. 37: Salt-Spray Test													C	C	C			
Test No. 38: Rain-tightness													C	C	C			

Table 1. Summary of ANSI C12.1-2001 and C12.20-2002 Test Results

2.0 Equipment Configuration

2.1 Overview

The purpose of this series of tests was to verify compliance of the Wasion Group Limited Libra Meters (referred to as EUT hereafter) with the limits of ANSI C12.1-2001 for Electric Meters, Code for Electricity Meters and C12.20-2002 for Electricity Meters - 0.2 and 0.5 Accuracy Classes.

Model(s) Tested:	Libra Meters
Model(s) Covered:	Libra Meters
EUT Specifications:	Class: 200
Analysis:	The results obtained relate only to the item(s) tested.
Ambient Lab Test Conditions:	Temperature: 23º C±2°C
	Relative Humidity: 30-60%
	Atmospheric Pressure: 860-1060 mbar
Evaluated by:	Francis Chau and William Murphy

2.2 Test Site

All testing was performed at MET Laboratories, Inc., 914 W. Patapsco Ave., Baltimore, MD 21230. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

2.3 Description of Test Sample

The Libra Meters Equipment Under Test (EUT) is a residential watt-hour meter for monitoring power consumption.

2.4 Equipment Configuration

All equipment incorporated as part of the EUT is included in the following list.

Form Factor	Meter Class	Voltage(s)	Model / Part Number	Serial Number
2S	200	240	Libra	20081165010282
2S	200	240	Libra	20081165010283
2S	200	240	Libra	20081165010284
2S	200	240	Libra	20081165010285
2S	200	240	Libra	20081165010268
2S	200	240	Libra	20081165010270
2S	200	240	Libra	20081165010275
2S	200	240	Libra	20081165010293
2S	200	240	Libra	20081165010294
2S	200	240	Libra	20081165010295
2S	200	240	Libra	20081165010286
2S	200	240	Libra	20081165010287
2S	200	240	Libra	20081165010296
2S	200	240	Libra	20081165010297
2S	200	240	Libra	20081165010298
2S	200	240	Libra	20081165010271
2S	200	240	Libra	20081165010280
2S	200	240	Libra	20081165010279

Table 2. Equipment Configuration

2.5 Mode of Operation

Display Item	
Quantities	
	Energy in kWh
	Instantaneous Power
Segment Check	
Real Time Indicators	
	Watthour Disk Emulator
	Energy Direction with Indicator Arrows
Static Indicators	
	kWh/kVArh/kVAh

2.6 Method of Monitoring EUT Operation

1. Observe display for any anomalous indications.
2. At end of each test, read the register value displayed on LCD screen in ALT mode*.

*ALT mode. If you move a magnetic (optical probe) near to meter's optical port, the meter will change to ALT display mode and cycle trough the following readings:

ID	Name	Accuracy	Disp Mode	Description
01	+kWh	1kWh	Alternate	Received active energy
02	-kWh	1kWh	Alternate	Delivered active energy
03	Added kWh	1kWh	Normal /Alternate	Received + Delivered active energy
04	Net kWh	1kWh	Alternate	Received - Delivered active energy
05	VA	1kVAh	Alternate	Apparent energy
06	+kVARh	1kVArh	Alternate	Received reactive energy
07	- kVARh	1kVArh	Alternate	Delivered reactive energy
08	Power	0.001kW	Alternate	Instantaneous power
09	Vrms	0.1V	Alternate	Voltage
10	Irms	0.1A	Alternate	Current
11	+Demand	0.001kW	Alternate	Received active demand
12	- Demand	0.001kW	Alternate	Delivered active demand
13	Frequency	0.01Hz	Alternate	Working frequency
14	Temperature	0.1℃	Alternate	The temperature measured by the Chip.
15	Date		Alternate	yy.MM.dd
16	Time		Alternate	hh:mm:ss
17	Status		Alternate	The Status code of Meter
18	Error		Alternate	The Error code of Meters

3. Read meter through optical probe.

2.7 Modifications

2.7.1 Modifications to EUT

No modifications were made to the EUT.

2.7.2 Modifications to Test Standard

No modifications were made to the test standard.

2.8 Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to Wasion Group Limited upon completion of testing.

3.0 Performance Requirements – Accuracy Tests, Internal Influences

Performance Verification

Test: Performance Verification Customer: Wasion Model: Libra S/N: 20081165010282 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839				
volt	**amp**	**phase_angle**	**freq**	**% reg**
240V	30	0	60	99.96
240V	3	0	60	99.976
240V	30	300	60	99.981

Table 3. Performance Verifications Data, Meter Serial No. 10282

Test: Performance Verification Customer: Wasion Model: Libra S/N: 20081165010283 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839				
volt	**amp**	**phase_angle**	**freq**	**% reg**
240V	30	0	60	100.06
240V	3	0	60	100.0705
240V	30	300	60	100.048

Table 4. Performance Verifications Data, Meter Serial No. 10283

Test: Performance Verification Customer: Wasion Model: Libra S/N: 20081165010284 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839				
volt	**amp**	**phase_angle**	**freq**	**% reg**
240V	30	0	60	99.98
240V	3	0	60	99.9895
240V	30	300	60	99.999

Table 5. Performance Verifications Data, Meter Serial No. 10284

Test: Performance Verification Customer: Wasion Model: Libra S/N: 20081165010285 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839				
volt	**amp**	**phase_angle**	**freq**	**% reg**
240V	30	0	60	100.023
240V	3	0	60	100.0305
240V	30	300	60	100.012

Table 6. Performance Verifications Data, Meter Serial No. 10285

Test: Performance Verifcation Customer: Waison Model: Libra S/N: x298 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839					
volt	**amp**	**phase_angle**	**freq**	**% reg**	**% error**
240V	30	0	60	100.011	0.011
240V	3	0	60	100.026	0.026
240V	30	300	60	100.024	0.024

Table 7. Performance Verifications Data, Meter Serial No. 10298

Test: Performance Verifcation Customer: Waison Model: Libra S/N: x296 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839					
volt	**amp**	**phase_angle**	**freq**	**% reg**	**% error**
240V	30	0	60	100.017	0.017
240V	3	0	60	100.043	0.043
240V	30	300	60	100.055	0.055

Table 8. Performance Verifications Data, Meter Serial No. 10296

Test: Performance Verifcation Customer: Waison Model: Libra S/N: x297 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839					
volt	**amp**	**phase_angle**	**freq**	**% reg**	**% error**
240V	30	0	60	100.013	0.013
240V	3	0	60	100.029	0.029
240V	30	300	60	100.085	0.085

Table 9. Performance Verifications Data, Meter Serial No. 10297

Test: Performance Verification Customer: Wasion Model: Libra S/N: 20081165010286 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839				
volt	**amp**	**phase_angle**	**freq**	**% reg**
240V	30	0	60	100.035
240V	3	0	60	100.0015
240V	30	300	60	100.05

Table 10. Performance Verifications Data, Meter Serial No. 10286

Test: Performance Verification Customer: Wasion Model: Libra S/N: 20081165010287 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839				
volt	**amp**	**phase_angle**	**freq**	**% reg**
240V	30	0	60	99.987
240V	3	0	60	99.993
240V	30	300	60	100.061

Table 11. Performance Verifications Data, Meter Serial No. 10287

Photograph 1. Performance Verification, Setup

Test No. 1: No Load

Test Requirement(s): The metering device with the voltage circuit(s) energized and current circuit(s) open shall not make one complete revolution of the rotor or more than one equivalent revolution in watt hours within 10 minutes and no additional complete revolutions of the rotor or test output indications in the next 20 minutes.

Test Procedures: The EUT was energized and the rotor observed for movement for a 20 minute period.

Test Results: The EUT was compliant with the requirement of this Section.

Test Engineer(s): William Murphy

Test Date(s): 10/12/09 to 10/13/09

Test No. 1: No Load

Test: 1 No Load Customer: Wasion Model: Libra Job Number: 27839				
Serial Number:	x284	**Condition**	**Current**	**Forward kWh**
FM:	2S	t = 0 min	0	0.2
Class:	200	t = 10 min	0	0.2
Voltage:	240V	t = 30 min	0	0.2
Serial Number:	x286	**Condition**	**Current**	**Forward kWh**
FM:	2S	t = 0 min	0	2.5
Class:	200	t = 10 min	0	2.5
Voltage:	240V	t = 30 min	0	2.5
Serial Number:	x287	**Condition**	**Current**	**Forward kWh**
FM:	2S	t = 0 min	0	0.0
Class:	200	t = 10 min	0	0.0
Voltage:	240V	t = 30 min	0	0.0

Table 12. Test No. 1: No Load, Test Results

Test No. 1: No Load, Test Setup

Photograph 2. Test No. 1: No Load, Test Setup

Test No. 2: Starting Load

Test Requirement(s): The meter shall operate with a load current specified in Table 13 using the lowest rated voltage.

Current Class	Current in Amps	
	0.5 Accuracy	0.2 Accuracy
2	0.001	0.001
10	0.01	0.01
20	0.01	0.01
100	0.05	0.05
200	0.10	0.10
320	0.16	0.16

Table 13. Starting Load Test

Test Results: The EUT was compliant with the requirement of this Section.

Test Engineer(s): William Murphy

Test Date(s): 10/13/09

Test No. 2: Starting Load

Test: 2 Starting Load
Customer: Wasion
Model: Libra
Job Number: 27839

Serial Number	Voltage	Class	FM	Load Current	Import/Export	Continuously Operate (Y/N)
20081165010284	240V	200	2S	0.1	Export	Yes
20081165010287	240V	200	2S	0.1	Export	Yes
20081165010286	240V	200	2S	0.1	Export	Yes

Table 14. Test No. 2: Starting Load, Test Results

Test No. 2: Starting Load, Test Setup

Photograph 3. Test No. 2: Starting Load, Test Setup

Test No. 3: Load Performance

Test Requirement(s): The performance of the meter shall not deviate from the reference registration by an amount exceeding that specified in Table 15.

Condition	Current in Amperes					Maximum Deviation in Percent from Reference Performance	
	Current Class					Accuracy Class	
	10	20	100	200	320	0.5	0.2
(1)	0.15	0.15	1.0	2.0	3.0	±1.0	±.4
(2)	0.25	0.25	1.5	3.0	5.0	±0.5	±0.2
(3)	0.50	0.5	3.0	6.0	10	±0.5	±0.2
(4)	1.5	1.5	10	20	30	±0.5	±0.2
(5)	2.5	2.5	15	30	50	Reference	Reference
(6)	--	5.0	30	60	75	±0.5	±0.02
(7)	5.0	10	50	100	100	±0.5	±0.02
(8)	7.5	15	75	150	150	±0.5	±0.02
(9)	--	18	90	180	250	±0.5	±0.02
(10)	10	--	100	200	300	±0.5	±0.02
(11)	--	20	--	--	320	±0.5	±0.02

Table 15. Load Performance Tests

Test Results: The EUT was compliant with the requirement of this Section.

Test Engineer(s): William Murphy

Test Date(s): 10/13/09

Test No. 3: Load Performance

Test: 3 Load Performance Customer: Wasion Model: Libra S/N: x286 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839						
volt	**amp**	**phase_angle**	**freq**	**% reg**	**deviation**	**0.5 class**
240V	2	0	60	99.9925	-0.013	+/- 1.0
240V	3	0	60	100.0025	-0.004	+/- 0.5
240V	6	0	60	100.0335	0.028	+/- 0.5
240V	20	0	60	100.0210	0.015	+/- 0.5
240V	30	0	60	100.006		reference
240V	60	0	60	99.9995	-0.007	+/- 0.5
240V	100	0	60	100.0225	0.016	+/- 0.5
240V	150	0	60	99.9785	-0.028	+/- 0.5
240V	180	0	60	100.0235	0.017	+/- 0.5
240V	200	0	60	100.0345	0.028	+/- 0.5

Table 16. Test No. 3: Load Performance, Form 2S, Meter Serial No. 10286, Test Results

Test: 3 Load Performance
Customer: Wasion
Model: Libra
S/N: x284
Meter Form: 2S
Meter Class: 200
Voltage: 240V
Job Number: 27839

volt	amp	phase_angle	freq	% reg	deviation	0.5 class
240V	2	0	60	100.011	-0.013	+/- 1.0
240V	3	0	60	100.018	-0.005	+/- 0.5
240V	6	0	60	100.013	-0.010	+/- 0.5
240V	20	0	60	100.021	-0.002	+/- 0.5
240V	30	0	60	100.024		reference
240V	60	0	60	100.014	-0.010	+/- 0.5
240V	100	0	60	99.999	-0.025	+/- 0.5
240V	150	0	60	100.026	0.002	+/- 0.5
240V	180	0	60	100.029	0.005	+/- 0.5
240V	200	0	60	99.9465	-0.077	+/- 0.5

Table 17. Test No. 3: Load Performance, Form 2S, Meter Serial No. 10284, Test Results

Test: 3 Load Performance Customer: Wasion Model: Libra S/N: x287 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839						
volt	**amp**	**phase_angle**	**freq**	**% reg**	**deviation**	**0.5 class**
240V	2	0	60	99.878	-0.092	+/- 1.0
240V	3	0	60	99.875	-0.095	+/- 0.5
240V	6	0	60	99.793	-0.177	+/- 0.5
240V	20	0	60	99.776	-0.194	+/- 0.5
240V	30	0	60	99.970		reference
240V	60	0	60	99.955	-0.015	+/- 0.5
240V	100	0	60	99.943	-0.027	+/- 0.5
240V	150	0	60	100.012	0.042	+/- 0.5
240V	180	0	60	99.956	-0.014	+/- 0.5
240V	200	0	60	99.926	-0.044	+/- 0.5

Table 18. Test No. 3: Load Performance, Form 2S, Meter Serial No. 10287, Test Results

Test No. 3: Load Performance, Test Setup

Photograph 4. Test No. 3: Load Performance, Test Setup

Test No. 4: Effect of Variation of Power Factor

Test Requirement(s): Each element of a multi-element meter shall be tested as a single element meter, but all voltage circuits shall be in parallel.

Test Results: The EUT was compliant with the requirement of this Section.

Test Engineer(s): William Murphy

Test Date(s): 10/13/09

Test No. 4, Effect of Variation of Power Factor

Test: 4 Var of Pwr Factor Customer: Wasion Model: Libra S/N: x286 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839						
volt	**amp**	**phase_angle**	**freq**	**% reg**	**deviation**	**0.5 class**
240V	3	0	60	100.0045		Reference
240V	6	300	60	99.9925	-0.012	+/- 1.0
240V	100	0	60	100.027		Reference
240V	100	300	60	100.1071	0.0801	+/- 0.6
240V	200	0	60	100.0245		Reference
240V	200	300	60	100.1186	0.0941	+/- 0.6

Table 19. Test No. 4: Effect of Variation of Power Factor, Form 2S, Meter Serial No. 10286, Test Results

Test: 4 Var of Pwr Factor Customer: Wasion Model: Libra S/N: x284 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839						
volt	**amp**	**phase_angle**	**freq**	**% reg**	**deviation**	**0.5 class**
240V	3	0	60	100.0165		Reference
240V	6	300	60	99.983	-0.0335	+/- 1.0
240V	100	0	60	100.033		Reference
240V	100	300	60	100.066	0.033	+/- 0.6
240V	200	0	60	100.0375		Reference
240V	200	300	60	100.1352	0.0977	+/- 0.6

Table 20. Test No. 4: Effect of Variation of Power Factor, Form 2S, Meter Serial No. 10284, Test Results

Test: 4 Var of Pwr Factor
Customer: Wasion
Model: Libra
S/N: x287
Meter Form: 2S
Meter Class: 200
Voltage: 240V
Job Number: 27839

volt	amp	phase_angle	freq	% reg	deviation	0.5 class
240V	3	0	60	99.991		Reference
240V	6	300	60	99.937	-0.0545	+/- 1.0
240V	100	0	60	100.028		Reference
240V	100	300	60	100.119	0.0911	+/- 0.6
240V	200	0	60	100.027		Reference
240V	200	300	60	100.157	0.1297	+/- 0.6

Table 21. Test No. 4: Effect of Variation of Power Factor, Form 2S, Meter Serial No. 10287, Test Results

Test No. 4: Effect of Variation of Power Factor, Test Setup

Photograph 5. Test No. 4: Effect of Variation of Power Factor, Test Setup

Test No. 5: Effect of Variation of Voltage

Test Requirement(s): The effect of variation of voltage upon the performance of the meter shall not exceed that specified in Table 22.

Condition	Current in Amperes						Maximum Deviation in Percent from Reference Performance	
	Current Class						Accuracy Class	
	2	10	20	100	200	320	0.5	0.2
Reference performance 100% of calibration voltage for condition (1) and (2)	0.025	0.25	0.25	1.5	3	5	Reference	Reference
Condition (1) 90% of calibration voltage	0.025	0.25	0.25	1.5	3	5	±0.2	±0.1
Condition (2) 110% of calibration voltage	0.025	0.25	0.25	1.5	3	5	± .2	± 0.1
Reference performance 100% of calibration voltage for conditions (3) and (4)	0.25	2.5	2.5	15	30	50	Reference	Reference
Condition (3) 90% of calibration voltage	0.25	2.5	2.5	15	30	50	±0.2	±0.1
Condition (4) 110% of calibration voltage	0.25	2.5	2.5	15	30	50	±0.2	±0.1

Table 22. Effect of Variation of Voltage

Test Results: The EUT was compliant with the requirement of this Section.

Test Engineer(s): William Murphy

Test Date(s): 10/13/09 & 10/14/09

Test No. 5, Effect of Variation of Voltage

Test: 5 Var of Voltage Customer: Wasion Model: Libra S/N: x286 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839						
volt	**amp**	**phase_angle**	**freq**	**% reg**	**deviation**	**0.5 class**
240V	3	0	60	99.996		Reference
216V	3	0	60	100.004	0.00845	+/-0.2
264V	3	0	60	100.020	0.02395	+/-0.2
240V	30	0	60	100.005		Reference
216V	30	0	60	100.002	-0.003	+/-0.2
264V	30	0	60	100.013	0.008	+/-0.2

Table 23. Test No. 5: Effect of Variation of Voltage, Form 2S, Meter serial No. 10286, Test Results

Test: 5 Var of Voltage Customer: Wasion Model: Libra S/N: x284 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839						
volt	**amp**	**phase_angle**	**freq**	**% reg**	**deviation**	**0.5 class**
240V	3	0	60	100.015		Reference
216V	3	0	60	100.000	-0.0145	+/-0.2
264V	3	0	60	100.016	0.0015	+/-0.2
240V	30	0	60	100.013		Reference
216V	30	0	60	100.020	0.007	+/-0.2
264V	30	0	60	100.003	-0.0095	+/-0.2

Table 24. Test No. 5: Effect of Variation of Voltage, Form 2S, Meter serial No. 10284, Test Results

Test: 5 Var of Voltage
Customer: Wasion
Model: Libra
S/N: x287
Meter Form: 2S
Meter Class: 200
Voltage: 240V
Job Number: 27839

volt	amp	phase_angle	freq	% reg	deviation	0.5 class
240V	3	0	60	99.989		Reference
216V	3	0	60	99.976	-0.0125	+/-0.2
264V	3	0	60	100.011	0.022	+/-0.2
240V	30	0	60	99.991		Reference
216V	30	0	60	99.993	0.002	+/-0.2
264V	30	0	60	99.997	0.006	+/-0.2

Table 25. Test No. 5: Effect of Variation of Voltage, Form 2S, Meter serial No. 10287, Test Results

Test No. 5: Effect of Variation of Voltage, Test Setup

Photograph 6. Test No. 5: Effect of Variation of Voltage, Test Setup

Test No. 6: Effect of Variation of Frequency

Test Requirement(s): The effect of variation of frequency upon the registration of a meter carrying constant load shall not exceed that specified in Table 26.

Condition	Current in Amperes						Percent	Max. Deviation in % from Reference Performance	
	Current Class						Rated	Accuracy Class	
	2	10	20	100	200	320	Frequency	0.5	0.2
Reference performance for conditions (1) & (2)	0.025	0.25	0.25	1.5	3	5	100	Reference	Reference
Condition (1)	0.025	0.25	0.25	1.5	3	5	98	± 0.2	± 0.1
Condition (2)	0.025	0.25	0.25	1.5	3	5	102	± 0.2	± 0.1
Reference performance for conditions (3) & (4)	0.25	2.5	2.5	15	30	50	100	Reference	Reference
Condition (3)	0.25	2.5	2.5	15	30	50	98	± .2 0	± 0.1
Condition (4)	0.25	2.5	2.5	15	30	50	102	± .2 0	± 0.1

Table 26. Effect of Variation of Frequency

Test Results: The EUT was compliant with the requirement of this Section.

Test Engineer(s): William Murphy

Test Date(s): 10/14/09

Test No. 6, Effect of Variation of Frequency

Test: 6 Var of Freq Customer: Wasion Model: Libra S/N: x286 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839						
volt	**amp**	**phase_angle**	**freq**	**% reg**	**deviation**	**0.5 class**
240V	3	0	60	99.996		Reference
240V	3	0	58.8	99.999	0.0025	+/-0.2
240V	3	0	61.2	99.986	-0.01	+/-0.2
240V	30	0	60	100.010		Reference
240V	30	0	58.8	99.994	-0.016	+/-0.2
240V	30	0	61.2	100.020	0.01	+/-0.2

Table 27. Test No. 6: Effect of Variation of Frequency, Form 2S, Meter Serial No. 10286, Test Results

Test: 6 Var of Freq Customer: Wasion Model: Libra S/N: x284 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839						
volt	**amp**	**phase_angle**	**freq**	**% reg**	**deviation**	**0.5 class**
240V	3	0	60	100.010		Reference
240V	3	0	58.8	100.006	-0.0035	+/-0.2
240V	3	0	61.2	100.091	0.0816	+/-0.2
240V	30	0	60	100.021		Reference
240V	30	0	58.8	99.995	-0.026	+/-0.2
240V	30	0	61.2	99.996	-0.025	+/-0.2

Table 28. Test No. 6: Effect of Variation of Frequency, Form 2S, Meter Serial No. 10284, Test Results

Test: 6 Var of Freq Customer: Wasion Model: Libra S/N: x287 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839						
volt	**amp**	**phase_angle**	**freq**	**% reg**	**deviation**	**0.5 class**
240V	3	0	60	99.993		Reference
240V	3	0	58.8	99.979	-0.014	+/-0.2
240V	3	0	61.2	99.986	-0.007	+/-0.2
240V	30	0	60	99.987		Reference
240V	30	0	58.8	99.989	0.0025	+/-0.2
240V	30	0	61.2	100.006	0.019	+/-0.2

Table 29. Test No. 6: Effect of Variation of Frequency, Form 2S, Meter Serial No. 10287, Test Results

Test No. 6: Effect of Variation of Frequency, Test Setup

Photograph 7. Test No. 6: Effect of Variation of Frequency, Test Setup

Test No. 7: Equality of Current Circuits

Test Requirement(s): The change in the performance of a multi-element meter when using only one current circuit, compared with the change when using all current circuits, shall not exceed that specified in Table 30.

Condition	Connections of Current Circuits	Current in Amperes						Max. Deviation in % from Reference Performance	
		Current Class						Accuracy Class	
		2	10	20	100	200	320	0.5	0.2
Reference performance for conditions (5), (6), (7), (8), etc.	All Circuits	0.025	0.25	0.25	1.5	3	5	Reference	Reference
Condition (5)	Circuit A only	0.025N*	0.25N*	0.25N*	1.5N*	3N*	5N*	±0.7	±0.3
Condition (6)	Circuit B only	0.025N*	0.25N*	0.25N*	1.5N*	3N*	5N*	±0.7	±0.3
Condition (7), (8), etc.	Circuits C, D, etc.	0.025N*	0.25N*	0.25N*	1.5N*	3N*	5N*	±0.7	±0.3
Reference performance for conditions (9), (10), (11), (12), etc.	All Circuits	0.25	2.5	2.5	15	30	50	Reference	Reference
Condition (9)	Circuit A only	0.25	2.5	2.5	15	30	50	±0.7	±0.3
Condition (10)	Circuit B only	0.25	2.5	2.5	15	30	50	±0.7	±0.3
Condition (11), (12), etc.	Circuits C, D, etc.	0.25	2.5	2.5	15	30	50	±0.7	±0.3

Table 30. Equality of Current Circuits

*N represents the number of elements in the meter

Test Results: The EUT was compliant with the requirement of this Section.

Test Engineer(s): William Murphy

Test Date(s): 10/14/09

Test No. 7: Equality of Current Circuits

Test: 7 Equality of Current Customer: Wasion Model: Libra S/N: x286 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839							
Circuit	**volt**	**amp**	**phase_angle**	**freq**	**%reg**	**deviation**	**0.5 class**
All	240V	3	0	60	100.008		Reference
A	240V	3	0	60	99.979	-0.029	+/-0.3
C	240V	3	0	60	99.971	-0.0375	+/-0.3
All	240V	30	0	60	100.027		Reference
A	240V	30	0	60	100.012	0	+/-0.3
C	240V	30	0	60	100.014	-0.0125	+/-0.3

Table 31. Test No. 7: Equality of Current Circuits, Form 2S, Meter Serial No. 10286, Test Results

Test: 7 Equality of Current Customer: Wasion Model: Libra S/N: x284 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number; 27839							
Circuit	**volt**	**amp**	**phase_angle**	**freq**	**%reg**	**deviation**	**0.5 class**
All	240V	3	0	60	99.969		Reference
A	240V	3	0	60	99.946	-0.023	+/-0.3
C	240V	3	0	60	99.943	-0.026	+/-0.3
All	240V	30	0	60	99.9745		Reference
A	240V	30	0	60	99.9655	-0.009	+/-0.3
C	240V	30	0	60	99.983	0.0085	+/-0.3

Table 32. Test No. 7: Equality of Current Circuits, Form 2S, Meter Serial No. 10284, Test Results

Test: 7 Equality of Current Customer: Wasion Model: Libra S/N: x287 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839							
step	**volt**	**amp**	**phase_angle**	**freq**	**%reg**	**deviation**	**0.5 class**
All	240V	3	0	60	100.010		Reference
A	240V	3	0	60	99.984	-0.0265	+/-0.3
C	240V	3	0	60	99.973	-0.037	+/-0.3
All	240V	30	0	60	99.983		Reference
A	240V	30	0	60	99.988	0	+/-0.3
C	240V	30	0	60	100.002	0.0185	+/-0.3

Table 33. Test No. 7: Equality of Current Circuits, Form 2S, Meter Serial No. 10287, Test Results

Test No. 7: Equality of Current Circuits, Test Setup

Photograph 8. Test No. 7: Equality of Current Circuits, Test Setup

Test No. 8: Internal Meter Losses

Test Requirement(s): The loss in each current circuit of a metering device shall not exceed 0.5 VA for Class 2, Class 10 and Class 20 meter devices or 1.0 VA for Class 100, Class 200 and Class 320 metering devices. The loss in each voltage circuit of a metering device shall neither exceed 5 watts or 20 VA. The losses in auxiliary devices that are powered by the meter power supply or connected to the line side terminals are not included.

Test Results: The EUT was compliant with the requirement of this Section.

Test Engineer(s): William Murphy

Test Date(s): 10/14/09 to 02/01/10

Test No. 8: Internal Meter Losses

Test: 8 Internal Meter Losses Customer: Waison Model: Libra Job Number: 27839				
S/N:	x298		VA	Limit:
Class:	200	Voltage	7.2	20 VA
FM:	2S	Current 1	0.210	1.0 VA
TA:	30	Current 2	0.249	1.0 VA
Voltage:	240V			
S/N:	x297		VA	Limit:
Class:	200	Voltage	9.6	20 VA
FM:	2S	Current 1	0.402	1.0 VA
TA:	30	Current 2	0.234	1.0 VA
Voltage:	240V			
S/N:	x296		VA	Limit:
Class:	200	Voltage	9.6	20 VA
FM:	2S	Current 1	0.258	1.0 VA
TA:	30	Current 2	0.231	1.0 VA
Voltage:	240V			

Table 34. Test No.8: Internal Meter Losses, Test Results

Test No. 8: Internal Meter Losses, Test Setup

Photograph 9. Test No. 8: Internal Meter Losses, Test Setup

Test No. 9: Temperature Rise

Test Requirement(s): Refer to subclause 4.7.2.9 of ANSI C12.1-2001 except that Table 35 (below) is to be used in place of Table 16, subclause 4.7.2.9.1, and subclause 4.7.2.9.2 in C12.1-2001 (figures are in C12.1).

Meter Class	Wire-Size* (AWG Copper)	Current In Amperes	Detachable Meters	
			Socket Rating In Amperes	Simulated Meter
2	No. 12	2	20 (min)	None
10	No. 10	10	20 (min)	None
20	No. 10	20	20 (min)	None
100	No. 2	100	100	Fig. 1
200	No. 4/0	200	200	Fig. 2
320	1-500 MCM or 2-4/0	320	320	Fig. 3

Table 35. Temperature Rise

Test Results: The EUT was compliant with the requirement of this Section.

Test Engineer(s): William Murphy

Test Date(s): 10/14/09 to 02/26/10

Test No. 9: Temperature Rise

Test:	Temperature Rise
Customer:	Wasion
Model:	Libra
S/N:	x268
Meter Class:	200
Meter Form:	2S
Voltage:	240V
Job Number:	27839
Simulated Temp:	38
Measured Temp:	36
Empirical Temp Rise:	53

Table 36. Test No. 9: Temperature Rise, Form 2S, Meter Serial No. 10268, Test Results

Test:	Temperature Rise
Customer:	Wasion
Model:	Libra
S/N:	x271
Meter Class:	200
Meter Form:	2S
Voltage:	240V
Job Number:	27839
Simulated Temp:	38
Measured Temp:	33
Empirical Temp Rise:	50

Table 37. Test No. 9: Temperature Rise, Form 2S, Meter Serial No. 10271, Test Results

Test:	Temperature Rise
Customer:	Wasion
Model:	Libra
S/N:	x275
Meter Class:	200
Meter Form:	2S
Voltage:	240V
Job Number:	27839
Simulated Temp:	38
Measured Temp:	30
Empirical Temp Rise:	47

Table 38. Test No. 9: Temperature Rise, Form 2S, Meter Serial No. 10275, Test Results

Photograph 10. Test No. 9: Temperature Rise, Dummy Meter

Test No. 9: Temperature Rise, Test Setup

Photograph 11. Test No. 9: Temperature Rise, Test Setup

Test No. 10: Effect of Register Friction

Test Requirement(s): The change in meter registration after removal of a pointer-type register shall not exceed ±5% at 10% of test amperes (TA). This test may be omitted for solid-state metering devices.

Test Results: The EUT was not applicable with the requirement of this Section. The requirement is N/A because the EUT is a solid-state meter.

Test No. 11: Effect of Internal Heating

Test Requirement(s): The test shall be conducted with the meter conventionally mounted on a suitably rated meter mounting. Such meter shall be wired with conductor no less than 4 feet (8 foot jumper between terminals), sized adequately for the load range of the meter. Openings around the conductor, and any other openings, shall be closed with suitable material to prevent drafts. The effect of internal heating upon the performance of a meter shall not exceed that specified in Table 39.

The reference test is to be made immediately upon energizing the meter.

Condition	Current in Amperes			Maximum Deviation in Percent from Reference Performance	
	Current Class			Accuracy Class	
	100	200	320	0.5	0.2
Reference performance for conditions (1), (2), and (7)	100	200	320	Reference	Reference
Reference performance for conditions (3) and (5)	1.5	3	5	Reference	Reference
Reference performance for conditions (4) and (6)	15	30	50	Reference	Reference
Condition (1) One-half hour after application of load	100	200	320	±0.4	±0.4
Condition (2) One hour after application of load	100	200	320	±0.5	±0.4
Condition (3) Immediately following test for condition (2)	1.5	3	5	±0.5	±0.4
Condition (4) Immediately following test for condition (3)	15	30	50	±0.5	±0.4
Condition (5) Two hours after test for condition (at no load current during the two- 4) with meter hour interval	1.5	3	5	±0.5	±0.4
Condition (6) Immediately following test for condition (5)	15	30	50	±0.4	±0.4
Condition (7) Immediately following test for condition (6)	100	200	320	±0.4	±0.4

Table 39. Effect of Internal Heating for Current Classes 100, 200, and 320

Test Results: The EUT was compliant with the requirement of this Section.

Test Engineer(s): William Murphy

Test Date(s): 10/14/09 to 12/29/09

Test No. 11: Effect of Internal heating

Model: Libra S/N: x271 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839						
volt	**amp**	**phase_angle**	**freq**	**% reg**	**deviation**	**0.5 limit**
240V	200	0	60	99.8995		Reference
240V	3	0	60	100.0070		Reference
240V	30	0	60	99.9455		Reference
240V	200	0	60	99.9745	0.08	+/- 0.4
240V	200	0	60	99.9755	0.08	+/- 0.5
240V	3	0	60	100.038	0.03	+/- 0.5
240V	30	0	60	99.9960	0.05	+/- 0.5
240V	3	0	60	100.0065	0.00	+/- 0.5
240V	30	0	60	99.9715	0.03	+/- 0.4
240V	200	0	60	99.9261	0.03	+/- 0.4

Table 40. Test No. 11: Effect of Internal Heating, Form 2S, Meter Serial No. 10271, Test Results

Model: Libra S/N: x279 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839						
volt	**amp**	**phase_angle**	**freq**	**% reg**	**deviation**	**0.5 limit**
240V	200	0	60	100.0695		Reference
240V	3	0	60	100.1061		Reference
240V	30	0	60	100.1046		Reference
240V	200	0	60	100.0726	0.00	+/- 0.4
240V	200	0	60	100.053	-0.02	+/- 0.5
240V	3	0	60	100.0826	-0.02	+/- 0.5
240V	30	0	60	100.069	-0.04	+/- 0.5
240V	3	0	60	100.0976	-0.01	+/- 0.5
240V	30	0	60	100.1076	0.00	+/- 0.4
240V	200	0	60	100.0981	0.03	+/- 0.4

Table 41. Test No. 11: Effect of Internal Heating, Form 2S, Meter Serial No. 10279, Test Results

Model: Libra
S/N: x280
Meter Form: 2S
Meter Class: 200
Voltage: 240V
Job Number: 27839

volt	amp	phase_angle	freq	% reg	deviation	0.5 limit
240V	200	0	60	99.9525		Reference
240V	3	0	60	100.0896		Reference
240V	30	0	60	100.052		Reference
240V	200	0	60	100.0655	0.11	+/- 0.4
240V	200	0	60	99.954	0.00	+/- 0.5
240V	3	0	60	100.0751	-0.01	+/- 0.5
240V	30	0	60	100.014	-0.04	+/- 0.5
240V	3	0	60	100.0741	-0.02	+/- 0.5
240V	30	0	60	100.0515	0.00	+/- 0.4
240V	200	0	60	100.0005	0.05	+/- 0.4

Table 42. Test No. 11: Effect of Internal Heating, Form 2S, Meter Serial No. 10280, Test Results

Test No. 11: Effect of Internal Heating, Test Setup

Photograph 12. Test No. 11: Effect of Internal Heating, Test Setup

Test No. 12: Effect of Tilt

Test Requirement(s): The top of the metering device shall be tilted at an angle of 4 degrees from the vertical: (1) forward, (2) backward, (3) left, and (4) right. The effect of tilt upon the registration of a metering device shall not exceed the maximum deviation specified in Table 43. This test may be omitted for solid-state metering devices.

Condition	Current Class					Maximum Deviation in Percent from Reference Performance	
	10	20	100	200	320		
	Current in Amperes						
Reference performance for conditions (1), (2), (3) and (4)	0.25	0.25	1.5	3	5	Reference	
Condition (1) Top of meter tilted 4 degrees forward	0.25	0.25	1.5	3	5	Reference	Reference
Condition (2) Top of meter tilted 4 degrees backward	0.25	0.25	1.5	3	5	Reference	Reference
Condition (3) Top of meter tilted 4 degrees left	0.25	0.25	1.5	3	5	±0.4	±0.4
Condition (4) Top of meter tilted 4 degrees right	0.25	0.25	1.5	3	5	±0.5	±0.4
Reference performance for conditions (5), (6), (7) and (8)	2.5	2.5	15	30	50	Reference	
Condition (5) Top of meter tilted 4 degrees forward	2.5	2.5	15	30	50	±0.5	±0.4
Condition (6) Top of meter tilted 4 degrees backward	2.5	2.5	15	30	50	±0.5	±0.4
Condition (7) Top of meter tilted 4 degrees left	2.5	2.5	15	30	50	±0.4	±0.4
Condition (8) Top of meter tilted 4 degrees right	2.5	2.5	15	30	50	±0.4	±0.4

Table 43. Effect of Tilt

Test Results: The EUT was not applicable with the requirement of this Section. The requirement is N/A because the EUT is a solid-state meter.

Test No. 13: Stability of Performance

Test Requirement(s): The metering device shall be operated continuously. The percentage registration shall be determined at 10% of test amperes at the start of the test and at 10 successive intervals at least 24 hours apart within a period of 2 weeks. The change in. percentage registration from performance at the start of the test shall not exceed 1.0% on any subsequent test. Available nominal voltage and current can be used for the duration of this test except when the metering device is undergoing the specified accuracy test.

Test Results: The EUT was compliant with the requirement of this Section.

Test Engineer(s): William Murphy

Test Date(s): 10/14/09 to 03/12/10

Test No.13: Stability of Performance

Company : Wasion Product : Libra Project # : 27839 Test # 13 : Stability of Perfomance					
S/N:		x271	x268	x275	
Meter Class:		CL200	CL200	CL200	
Voltage:		240V	240V	240V	
Current (10% of TA):		3	3	3	
Direction:		Forward	Forward	Forward	Max %Dev
1 (Day 1)	% Reg	100.014%	99.952%	99.90%	
	%Dev	**Reference**	**Reference**	**Reference**	**Ref**
2 (Day 2)	% Reg	99.991%	100.003%	99.978%	
	%Dev	**0.02%**	**0.05%**	**0.08%**	**1.0%**
3 (Day 3)	% Reg	99.975%	99.972%	99.905%	
	%Dev	**0.04%**	**0.02%**	**0.00%**	**1.0%**
4 (Day 4)	% Reg	99.999%	99.952%	99.905%	
	%Dev	**0.01%**	**0.00%**	**0.00%**	**1.0%**
5 (Day 5)	% Reg	100.009%	99.955%	99.912%	
	%Dev	**0.01%**	**0.00%**	**0.01%**	**1.0%**
6 (Day 6)	% Reg	99.998%	99.965%	99.923%	
	%Dev	**0.02%**	**0.01%**	**0.02%**	**1.0%**
7 (Day 7)	% Reg	99.999%	99.969%	99.921%	
	%Dev	**0.01%**	**0.02%**	**0.02%**	**1.0%**
8 (Day 8)	% Reg	100.002%	99.984%	99.920%	
	%Dev	**0.01%**	**0.03%**	**0.02%**	**1.0%**
9 (Day 9)	% Reg	99.999%	99.985%	99.922%	
	%Dev	**0.01%**	**0.03%**	**0.02%**	**1.0%**
10 (Day 10)	% Reg	100.001%	99.980%	99.921%	
	%Dev	**0.01%**	**0.03%**	**0.02%**	**1.0%**
11 (Day 11)	% Reg	99.999%	99.98%	99.92%	
	%Dev	**0.01%**	**0.03%**	**0.02%**	**1.0%**

Table 44. Test No. 13: Stability of Performance, Test Results

Test No. 13: Stability of Performance, Test Setup

Photograph 13. Test No. 13: Stability of Performance, Test Setup, Meter Serial No. 10271

Photograph 14. Test No. 13: Stability of Performance, Test Setup, Meter Serial No. 10268 and 10275

Test No. 14: Effect of Polyphase Loading

Test Requirement(s): At full load and light load, with utility power factor, the difference between registration of ABC rotation, CBA rotation, and series load shall not exceed 0.6% for 0.5 accuracy class 0.3% for 0.2 accuracy class.

Test Results: The EUT was not applicable with the requirement of this Section. The requirement is N/A because the EUT is not a polyphase meter.

4.0 Performance Requirements – Accuracy Tests, External Influences

Test No. 15: Insulation

Test Requirement(s): The EUT must be able to withstand the application of a sinusoidal voltage of 2.5 kV rms, 60 Hz for one minute with the metering device voltage and current circuits de-energized. The input of the circuit of the pulse initiators with independent power supplies shall be tested at 1.5 kV rms, 60 Hz for one minute. For both the 1.5 and 2.5 kV rms test, the leakage current shall not exceed 0.005 Amps per circuit.

The metering device shall not exhibit a change in the least significant digit in its internal registers and will continue to operate normally after the test.

Test Procedures: The EUT was de-energized and the test voltage was applied directly across the appropriate terminal or metal parts of the meter. The current fault indicator on the hipot tester was set to 0.005 amps and the voltage to the unit was gradually increased to the specified level of 2500 Volts AC and left on for a period of 1 minute. During each test, the current fault indicator was monitored. After each test was completed, the unit was powered up and proper operation of the unit was verified.

Test Results: The EUT was compliant with the requirement of this Section.

Test Engineer(s): Francis Chau

Test Date(s): 10/13/09 to 01/04/10

Test No. 15: Insulation Test Results, Form 2S, SN10282

Test date:	Tuesday, October 13, 2009
Test Engineer:	FC
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1
Setup Verification:	FC On 10/13/2009
Photo Filename:	INS 27839
Compliance Date:	10/13/2009

EUT Descriptor:	Watthour Meters
Model number:	Libra
Serial number:	200811650282
Meter Form Factor:	Form 2S
Meter Class:	CL200
Rated Voltage (fixed or range):	240VAC
Mode & Monitoring:	Meter LCD Display
Modifications:	Series Test, none allowable

Test Conditions:

Environmental:	Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions): None	
	21°C	43%	102 mBar		
Parametric:	Under test:	Test Voltage, 60 Hz, sinusoidal	Stress Duration (each circuit)	Maximum Leakage Current (mA)	Repetitions
	AC Circuits	2.5 kVrms	60 sec	5	2
	I/O Data and Control lines*	N/A	N/A	N/A	N/A

* Note: this test applies only to *independently powered electrical* Pulse Initiator circuits (as opposed to optical systems) and to any I/O, data and control lines operating at a level of ≥40V. In all other cases, this test is waived.

Test Results:

AC Current Circuit Terminals	Pass/Fail (note all anomalies)
Line1 to Ground	0.06mA
Line2 to Ground	0.06mA

Line and Current of Max Leakage:	0.06mA
Pass/Fail:	Pass

Table 45. Test No. 15: Insulation, Form 2S, SN10282, Test Results

Test No. 15: Insulation Test Results, Form 2S, SN10283

Test date:	Tuesday, October 13, 2009
Test Engineer:	FC
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1
Setup Verification:	FC On 10/13/2009
Photo Filename:	INS 27839
Compliance Date:	10/13/2009

EUT Descriptor:	Watthour Meters
Model number:	Libra
Serial number:	200811650283
Meter Form Factor:	Form 2S
Meter Class:	CL200
Rated Voltage (fixed or range):	240VAC
Mode & Monitoring:	Meter LCD Display
Modifications:	Series Test, none allowable

Test Conditions:

Environmental:	Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions): None	
	21°C	43%	102 mBar		
Parametric:	Under test:	Test Voltage, 60 Hz, sinusoidal	Stress Duration (each circuit)	Maximum Leakage Current (mA)	Repetitions
	AC Circuits	2.5 kVrms	60 sec	5	2
	I/O Data and Control lines*	N/A	N/A	N/A	N/A

* Note: this test applies only to *independently powered electrical* Pulse Initiator circuits (as opposed to optical systems) and to any I/O, data and control lines operating at a level of ≥40V. In all other cases, this test is waived.

Test Results:

AC Current Circuit Terminals	Pass/Fail (note all anomalies)
Line1 to Ground	0.06mA
Line2 to Ground	0.06mA

Line and Current of Max Leakage:	0.06mA
Pass/Fail:	Pass

Table 46. Test No. 15: Insulation, Form 2S, SN10283, Test Results

Test No. 15: Insulation Test Results, Form 2S, SN10285

Test date:	Tuesday, October 13, 2009
Test Engineer:	FC
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1
Setup Verification:	FC On 10/13/2009
Photo Filename:	INS 27839
Compliance Date:	10/13/2009

EUT Descriptor:	Watthour Meters
Model number:	Libra
Serial number:	200811650285
Meter Form Factor:	Form 2S
Meter Class:	CL200
Rated Voltage (fixed or range):	240VAC
Mode & Monitoring:	Meter LCD Display
Modifications:	Series Test, none allowable

Test Conditions:

Environmental:	Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions): None	
	21°C	43%	102 mBar		
Parametric:	Under test:	Test Voltage, 60 Hz, sinusoidal	Stress Duration (each circuit)	Maximum Leakage Current (mA)	Repetitions
	AC Circuits	2.5 kVrms	60 sec	5	2
	I/O Data and Control lines*	N/A	N/A	N/A	N/A

* Note: this test applies only to *independently powered electrical* Pulse Initiator circuits (as opposed to optical systems) and to any I/O, data and control lines operating at a level of ≥40V. In all other cases, this test is waived.

Test Results:

AC Current Circuit Terminals	Pass/Fail (note all anomalies)
Line1 to Ground	0.28mA
Line2 to Ground	0.06mA

Line and Current of Max Leakage:	0.28mA
Pass/Fail:	Pass

Table 47. Test No. 15: Insulation, Form 2S, SN10285, Test Results

Test No. 15: Insulation Test Results, Form 2S, SN10268

Test date:	Monday, January 04, 2010
Test Engineer:	FC
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1
Setup Verification:	FC On 1/4/2010
Photo Filename:	INS 27839
Compliance Date:	1/4/2010

EUT Descriptor:	Watthour Meters
Model number:	Libra
Serial number:	20081165010268
Meter Form Factor:	Form 2S
Meter Class:	CL200
Rated Voltage (fixed or range):	240VAC
Mode & Monitoring:	Meter LCD Display
Modifications:	Series Test, none allowable

Test Conditions:

Environmental:	Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions): None	
	19°C	21%	101 mBar		
Parametric:	Under test:	Test Voltage, 60 Hz, sinusoidal	Stress Duration (each circuit)	Maximum Leakage Current (mA)	Repetitions
	AC Circuits	2.5 kVrms	60 sec	5	2
	I/O Data and Control lines*	N/A	N/A	N/A	N/A

* Note: this test applies only to *independently powered electrical* Pulse Initiator circuits (as opposed to optical systems) and to any I/O, data and control lines operating at a level of ≥40V. In all other cases, this test is waived.

Test Results:

AC Current Circuit Terminals	Pass/Fail (note all anomalies)
Line1 to Ground	Pass 0.05mA
Line2 to Ground	Pass 0.05mA

Line and Current of Max Leakage:	0.05mA
Pass/Fail:	Pass

Table 48. Test No. 15: Insulation, Form 2S, SN10268, Test Results

Test No. 15: Insulation Test Results, Form 2S, SN10270

Test date:	Monday, January 04, 2010
Test Engineer:	FC
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1
Setup Verification:	FC On 1/4/2010
Photo Filename:	INS 27839
Compliance Date:	1/4/2010

EUT Descriptor:	Watthour Meters
Model number:	Libra
Serial number:	20081165010270
Meter Form Factor:	Form 2S
Meter Class:	CL200
Rated Voltage (fixed or range):	240VAC
Mode & Monitoring:	Meter LCD Display
Modifications:	Series Test, none allowable

Test Conditions:

Environmental:	Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions): None	
	19°C	21%	101 mBar		
Parametric:	Under test:	Test Voltage, 60 Hz, sinusoidal	Stress Duration (each circuit)	Maximum Leakage Current (mA)	Repetitions
	AC Circuits	2.5 kVrms	60 sec	5	2
	I/O Data and Control lines*	N/A	N/A	N/A	N/A

* Note: this test applies only to *independently powered electrical* Pulse Initiator circuits (as opposed to optical systems) and to any I/O, data and control lines operating at a level of ≥40V. In all other cases, this test is waived.

Test Results:

AC Current Circuit Terminals	Pass/Fail (note all anomalies)
Line1 to Ground	Pass 0.05mA
Line2 to Ground	Pass 0.05mA

Line and Current of Max Leakage:	0.05 mA
Pass/Fail:	Pass

Table 49. Test No. 15: Insulation, Form 2S, SN10270, Test Results

Test No. 15: Insulation Test Results, Form 2S, SN10275

Test date:	Monday, January 04, 2010
Test Engineer:	FC
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1
Setup Verification:	FC On 1/4/2010
Photo Filename:	INS 27839
Compliance Date:	1/4/2010

EUT Descriptor:	Watthour Meters
Model number:	Libra
Serial number:	20081165010275
Meter Form Factor:	Form 2S
Meter Class:	CL200
Rated Voltage (fixed or range):	240VAC
Mode & Monitoring:	Meter LCD Display
Modifications:	Series Test, none allowable

Test Conditions:

Environmental:	Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions): None	
	19°C	21%	101 mBar		
Parametric:	Under test:	Test Voltage, 60 Hz, sinusoidal	Stress Duration (each circuit)	Maximum Leakage Current (mA)	Repetitions
	AC Circuits	2.5 kVrms	60 sec	5	2
	I/O Data and Control lines*	N/A	N/A	N/A	N/A

* Note: this test applies only to *independently powered electrical* Pulse Initiator circuits (as opposed to optical systems) and to any I/O, data and control lines operating at a level of ≥40V. In all other cases, this test is waived.

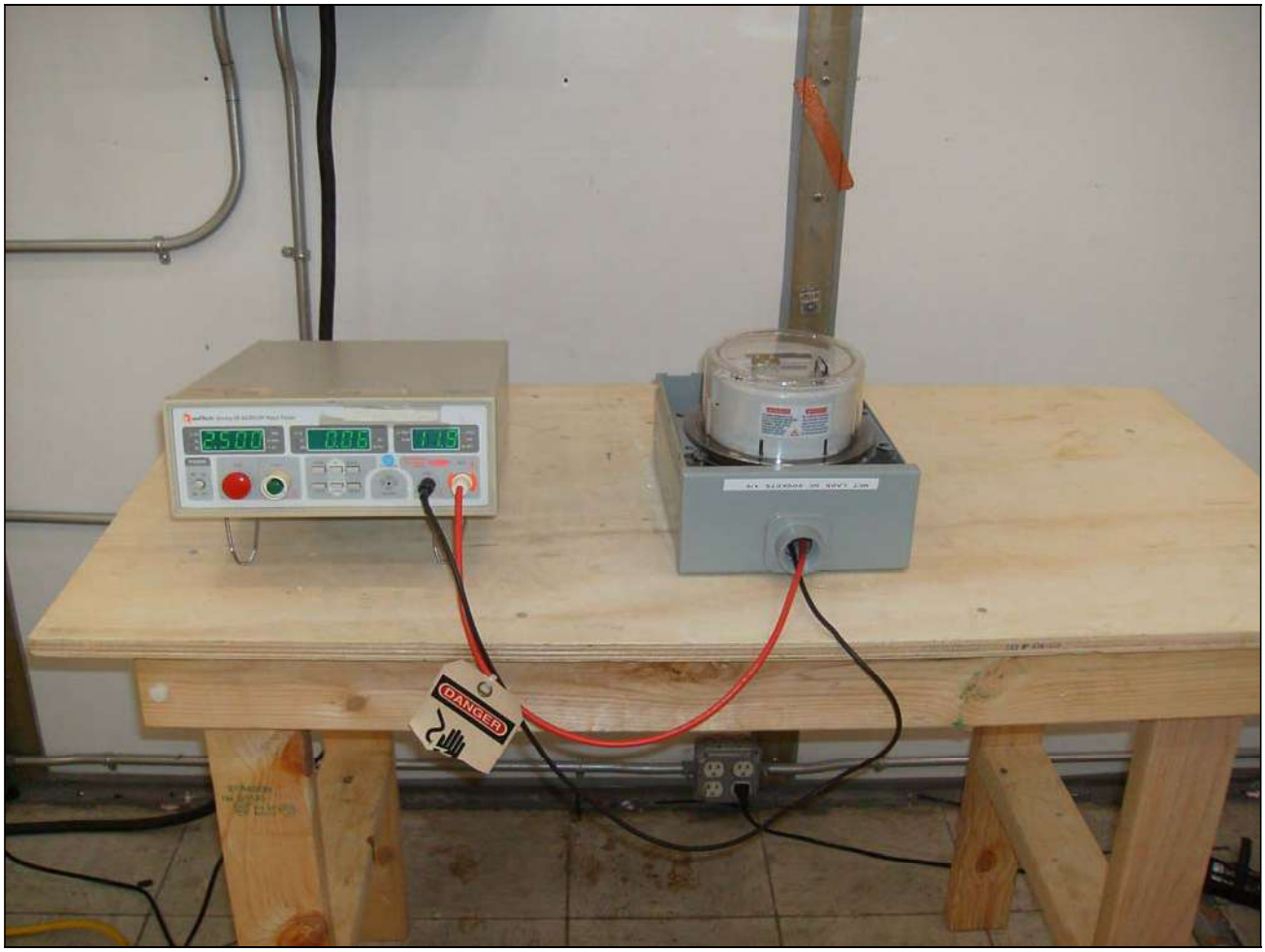
Test Results:

AC Current Circuit Terminals	Pass/Fail (note all anomalies)
Line1 to Ground	Pass 0.05mA
Line2 to Ground	Pass 0.05mA

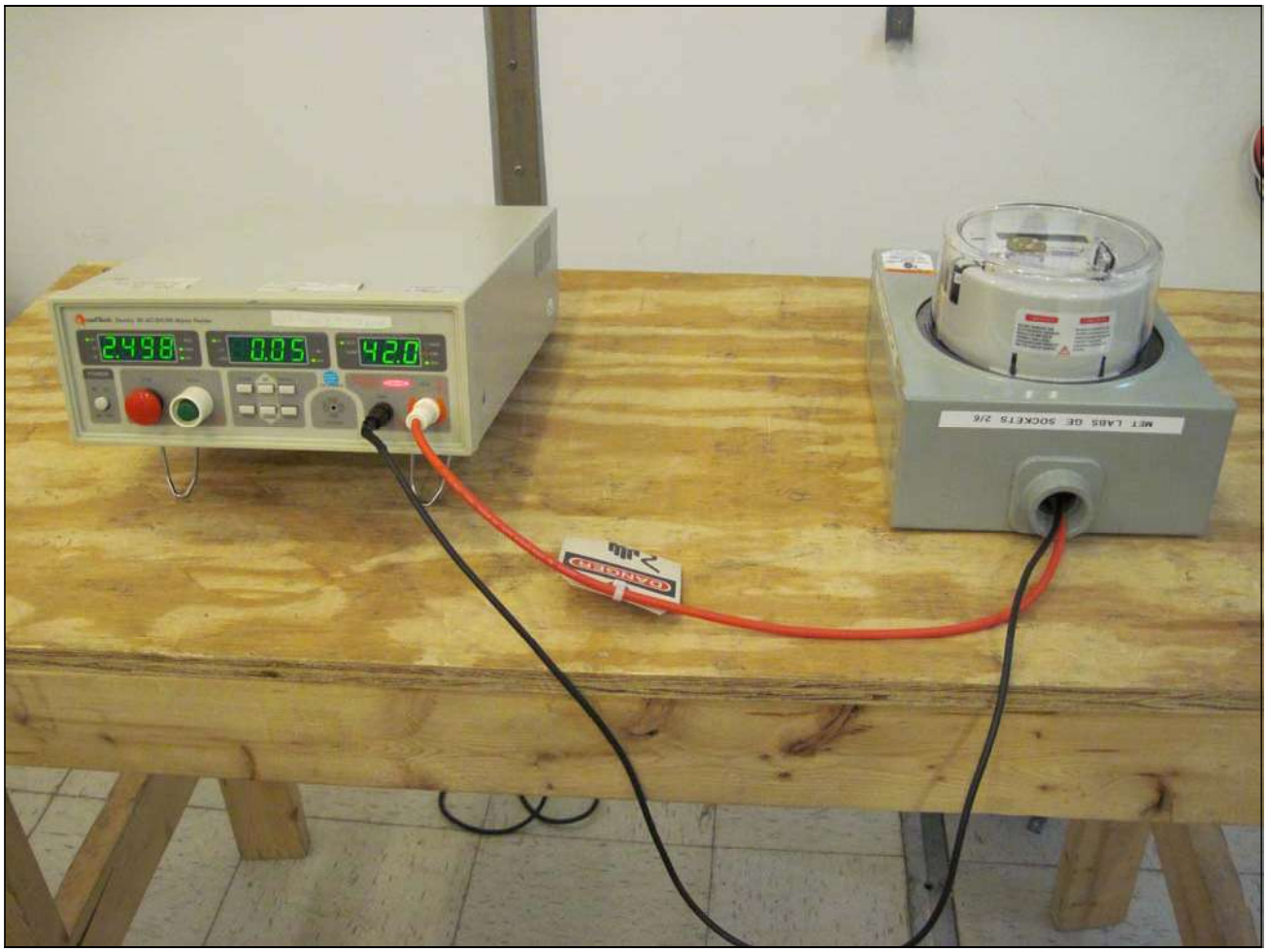
Line and Current of Max Leakage:	0.05mA
Pass/Fail:	Pass

Table 50. Test No. 15: Insulation, Form 2S, SN10275, Test Results

Test No. 15: Insulation Test Setup



Photograph 15. Test No. 15: Insulation, Test Setup



Photograph 16. Test No. 15: Insulation, Retest Setup

Test No. 16: Voltage Interruptions Test

Test Requirement(s): "No current shall be applied to the metering device current coils. Voltage shall be completely interrupted for six power line cycles (100 ms). The voltage interruption shall be applied ten times within an interval of no more than 10 seconds."

Test Procedures: The EUT was provided with AC power via the programmable power supply. The power supply was programmed to perform the applicable set of voltage dips, interruptions and variations. Each sequence was repeated a minimum of three times to verify the results.

Test Results: The EUT was compliant with the requirement of this Section.

Test Engineer(s): Francis Chau

Test Date(s): 10/13/09 to 01/06/10

Test No. 16: Voltage Interruptions, Form 2S, SN10282

Test date:	Tuesday, October 13, 2009
Test Engineer:	FC
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1
Setup Verification:	FC On 10/13/2009
Photo Filename:	PQF 27839
Compliance Date:	10/13/2009

EUT Descriptor:	Watthour Meters
Model number:	Libra
Serial number:	200811650282
Meter Form Factor:	Form 2S
Meter Class:	CL200
Rated Voltage (fixed or range):	240VAC
Mode & Monitoring:	Meter LCD Display
Modifications:	Series Test, none allowable

Test Conditions:

Environmental:	Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions): N/A	
	22°C	42%	102 mBar		
Parametric:	Current Circuits Energization:	Current Circuits Current:	Voltage Circuits Energization:	Duration of Interruption:	Interval (intra-interruptions)
	120 V	0 Arms	120 Vrms	6 cycles	10 seconds

Test Results:

Test Repetitions	Registration at start of test	Registration at end of test	Net Totalization	Meter functionality	Pass/Fail
10	2.0 Wh	2.0 Wh	0	No anomalies	Pass

Table 51. Test No.16: Voltage Interruption, Form 2S, SN10282, Test Results

Test No. 16: Voltage Interruptions, Form 2S, SN10283

Test date:	Tuesday, October 13, 2009
Test Engineer:	FC
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1
Setup Verification:	FC On 10/13/2009
Photo Filename:	PQF 27839
Compliance Date:	10/13/2009

EUT Descriptor:	Watthour Meters
Model number:	Libra
Serial number:	200811650283
Meter Form Factor:	Form 2S
Meter Class:	CL200
Rated Voltage (fixed or range):	240VAC
Mode & Monitoring:	Meter LCD Display
Modifications:	Series Test, none allowable

Test Conditions:

Environmental:	Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions): N/A	
	22°C	42%	102 mBar		
Parametric:	Current Circuits Energization:	Current Circuits Current:	Voltage Circuits Energization:	Duration of Interruption:	Interval (intra-interruptions)
	120 V	0 Arms	120 Vrms	6 cycles	10 seconds

Test Results:

Test Repetitions	Registration at start of test	Registration at end of test	Net Totalization	Meter functionality	Pass/Fail
10	0.0 Wh	0.0 Wh	0	No anomalies	Pass

Table 52. Test No.16: Voltage Interruption, Form 2S, SN10283, Test Results

Test No. 16: Voltage Interruptions, Form 2S, SN10285

Test date:	Tuesday, October 13, 2009	EUT Descriptor:	Watthour Meters
Test Engineer:	FC	Model number:	Libra
Metrak # :	27839	Serial number:	200811650285
Customer:	Wasion Group,Ltd	Meter Form Factor:	Form 2S
Specifications:	ANSI C12.1	Meter Class:	CL200
Setup Verification:	FC On 10/13/2009	Rated Voltage (fixed or range):	240VAC
Photo Filename:	PQF 27839	Mode & Monitoring:	Meter LCD Display
Compliance Date:	10/13/2009	Modifications:	Series Test, none allowable

Test Conditions:

Environmental:	Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions): N/A	
	22°C	42%	102 mBar		
Parametric:	Current Circuits Energization:	Current Circuits Current:	Voltage Circuits Energization:	Duration of Interruption:	Interval (intra-interruptions)
	120 V	0 Arms	120 Vrms	6 cycles	10 seconds

Test Results:

Test Repetitions	Registration at start of test	Registration at end of test	Net Totalization	Meter functionality	Pass/Fail
10	0.0 Wh	0.0 Wh	0	No anomalies	Pass

Table 53. Test No.16: Voltage Interruption, Form 2S, SN10285, Test Results

Test No. 16: Voltage Interruptions, Form 2S, SN10268

Test date:	Wednesday, January 06, 2010	EUT Descriptor:	Watthour Meters
Test Engineer:	FC	Model number:	Libra
Metrak # :	27839	Serial number:	20081165010268
Customer:	Wasion Group,Ltd	Meter Form Factor:	Form 2S
Specifications:	ANSI C12.1	Meter Class:	CL200
Setup Verification:	FC On 1/6/2010	Rated Voltage (fixed or range):	Bi - Phase 240VAC
Photo Filename:	PQF 27839	Mode & Monitoring:	Meter LCD Display
Compliance Date:	1/6/2010	Modifications:	Series Test, none allowable

Test Conditions:

Environmental:	Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions): N/A	
	21°C	21%	101.3 mBar		
Parametric:	Current Circuits Energization:	Current Circuits Current:	Voltage Circuits Energization:	Duration of Interruption:	Interval (intra-interruptions)
	120 V	0 Arms	120 Vrms	6 cycles	10 seconds

Test Results:

Test Repetitions	Registration at start of test	Registration at end of test	Net Totalization	Meter functionality	Pass/Fail
10	0.0 Wh	0.0 Wh	0	No anomalies	Pass

Table 54. Test No.16: Voltage Interruption, Form 2S, SN10268, Test Results

Test No. 16: Voltage Interruptions, Form 2S, SN10270

Test date:	Wednesday, January 06, 2010
Test Engineer:	FC
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1
Setup Verification:	FC On 1/6/2010
Photo Filename:	PQF 27839
Compliance Date:	1/6/2010

EUT Descriptor:	Watthour Meters
Model number:	Libra
Serial number:	20081165010270
Meter Form Factor:	Form 2S
Meter Class:	CL200
Rated Voltage (fixed or range):	Bi - Phase 240VAC
Mode & Monitoring:	Meter LCD Display
Modifications:	Series Test, none allowable

Test Conditions:

Environmental:	Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions): N/A	
	21°C	21%	101.3 mBar		
Parametric:	Current Circuits Energization:	Current Circuits Current:	Voltage Circuits Energization:	Duration of Interruption:	Interval (intra-interruptions)
	120 V	0 Arms	120 Vrms	6 cycles	10 seconds

Test Results:

Test Repetitions	Registration at start of test	Registration at end of test	Net Totalization	Meter functionality	Pass/Fail
10	0.0 Wh	0.0 Wh	0	No anomalies	Pass

Table 55. Test No.16: Voltage Interruption, Form 2S, SN10270, Test Results

Test No. 16: Voltage Interruptions, Form 2S, SN10275

Test date:	Wednesday, January 06, 2010	EUT Descriptor:	Watthour Meters
Test Engineer:	FC	Model number:	Libra
Metrak # :	27839	Serial number:	20081165010275
Customer:	Wasion Group,Ltd	Meter Form Factor:	Form 2S
Specifications:	ANSI C12.1	Meter Class:	CL200
Setup Verification:	FC On 1/6/2010	Rated Voltage (fixed or range):	Bi - Phase 240VAC
Photo Filename:	PQF 27839	Mode & Monitoring:	Meter LCD Display
Compliance Date:	1/6/2010	Modifications:	Series Test, none allowable

Test Conditions:

Environmental:	Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions): N/A	
	21°C	21%	101.3 mBar		
Parametric:	Current Circuits Energization:	Current Circuits Current:	Voltage Circuits Energization:	Duration of Interruption:	Interval (intra-interruptions)
	120 V	0 Arms	120 Vrms	6 cycles	10 seconds

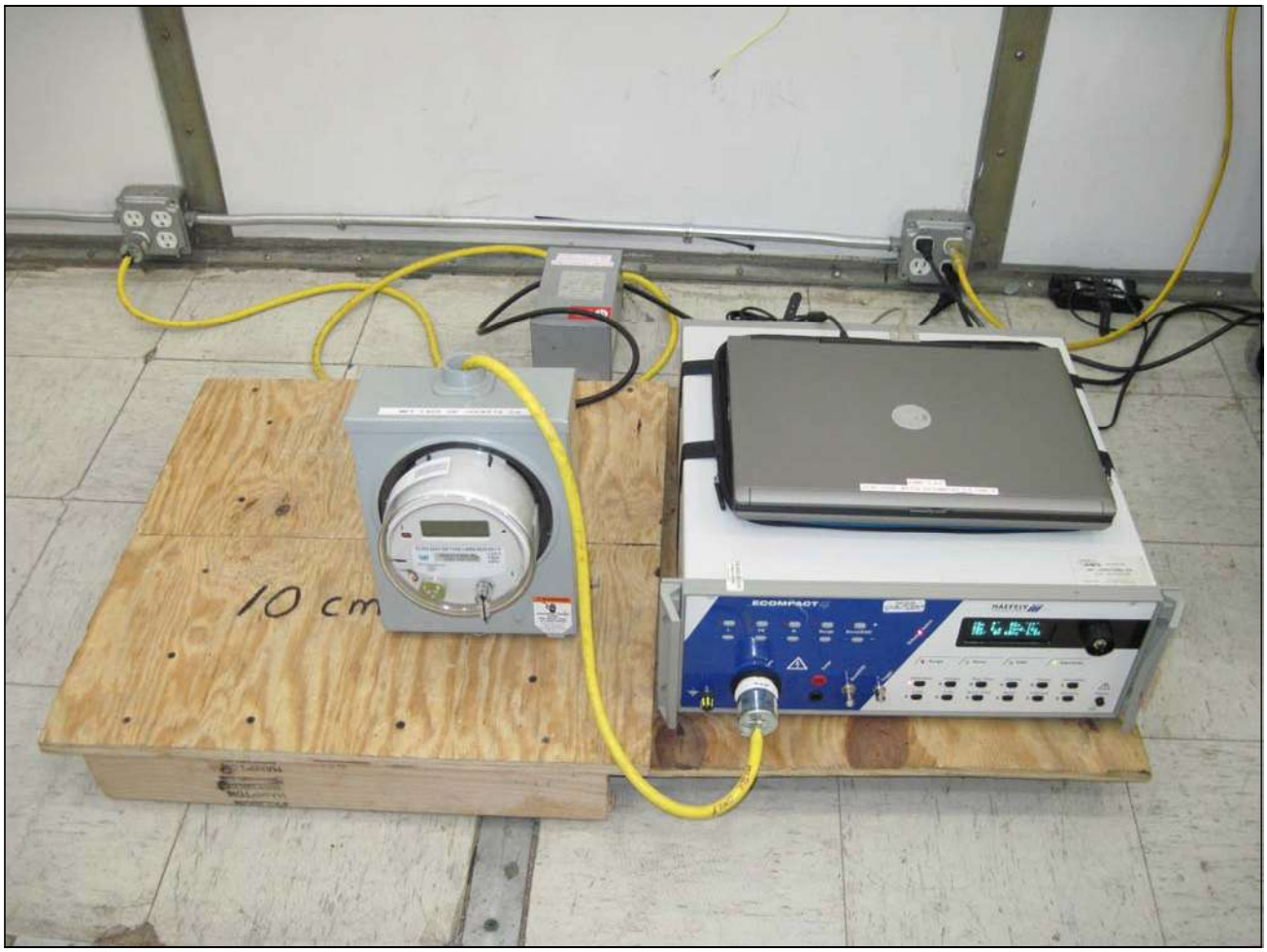
Test Results:

Test Repetitions	Registration at start of test	Registration at end of test	Net Totalization	Meter functionality	Pass/Fail
10	0.0 Wh	0.0 Wh	0	No anomalies	Pass

Table 56. Test No.16: Voltage Interruption, Form 2S, SN10275, Test Results

Test No. 16: Voltage Interruptions Test Setup

Photograph 17. Test No. 16: Voltage Interruptions Test, Test Setup



Photograph 18. Test No. 16: Voltage Interruptions Test, Retest Setup

Test No. 17: Effect of High Voltage Line Surges

Test Requirement(s): **ANSI C12.1 4.7.3.3.2. 1.2/50 µs – 8/20 µs Combination Wave** The standard 1.2/50 µs – 8/20 µs combination wave applied to the metering device shall be for location category B3 and system exposure high, as described in ANSI/IEEE C62.41, Table 3.

ANSI C12.1 4.7.3.3.1 100 kHz Ring Wave The standard 0.5 µs – 100 kHz Ring Wave applied to the metering device, shall be for Location Category B3 and System Exposure High, as described in ANSI/IEEE C62.41, Table 3.

Test Procedures: The test subjected the AC power input of the meter device to a 1.2/50 µs – 8/20 µs combination wave with a peak voltage of 6 kV and peak current of 3 kA.

The test subjected the power input of the meter device to a 100 kHz Ring Wave with a Peak Voltage of 6 kV and Short-Circuit Peak Current of 0.5 kA.

Test Results: The EUT was compliant with the requirement of this Section.

Test Engineer(s): Francis Chau and Zijun Tong

Test Date(s): 10/13/09 to 01/08/10

Test No. 17: Effect of High Voltage Surges – 1.2/50 µs Combination Wave, Form 2S, SN10268

Test date:	Thursday, January 07, 2010
Test Engineer:	FC
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1:2008
Setup Verification:	FC On 1/7/2010
Photo Filename:	Surge 27839 Comb Wave
Compliance Date:	1/7/2010

EUT Descriptor:	Watthour Meters
Model number:	Libra
Serial number:	20081165010268
Meter Form Factor:	Form 2S
Meter Class:	CL200
Rated Voltage (fixed or range):	240VAC
Mode & Monitoring:	Meter LCD Display
Modifications:	Series Test, none allowable

Test Conditions:

Environmental:	Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions):		
	19°C	21%	103 mBar			
Parametric:	Discharge Peak Voltage:	Source Impedance:	Discharge Peak Current:	Current Circuits Energization:	Current Circuits Current:	Voltage Circuits Energization:
	6 kVolt	2 Ohms	3 kAmperes	120 Vrms	0 Arms	120 Vrms

Test Results:

Discharge Mode and Lines *	1 discharges each polarity	Angular Injection @ 0 degrees Pass/Fail	Angular Injection @ 90 degrees Pass/Fail	Angular Injection @ 270 degrees Pass/Fail	Discharge Mode and Lines *	1 discharges each polarity	Angular Injection @ 0 degrees Pass/Fail	Angular Injection @ 90 degrees Pass/Fail	Angular Injection @ 270 degrees Pass/Fail
Transverse Mode Line1 to Neutral	positive	Pass	Pass	Pass	Common Mode Line 1 to Ground	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass		negative	Pass	Pass	Pass
Transverse Mode Line1 to Line 2	positive	Pass	Pass	Pass	Common Mode Neutral to Ground	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass		negative	Pass	Pass	Pass
Transverse Mode Line2 to Neutral	positive	Pass	Pass	Pass	Common Mode Line 2 to Ground	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass		negative	Pass	Pass	Pass
					Common Mode Line 1+ 2 + Neutral to PE	positive	Pass	Pass	Pass
						negative	Pass	Pass	Pass

Registration at Start:	Registration at End:
0.0 kWh	0.0 kWh
Perturbation Accrual	Meter functionality
0.000	No anomalies

Table 57. Test No. 17: Effect of High Voltage Surges – 1.2/50 µs Combination Wave, Form 2S, SN10268, Test Results

*Note: on certain form Factors, testing may be redundant for some Current or Voltage lines.

Test No. 17: Effect of High Voltage Surges – 1.2/50 µs Combination Wave, Form 2S, SN10283

Test date:	Wednesday, October 14, 2009
Test Engineer:	FC
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	C12.1
Setup Verification:	FC On 10/14/2009
Photo Filename:	Surge 27839 Comb Wave
Compliance Date:	10/14/2009

EUT Descriptor:	Watthour Meters
Model number:	Libra
Serial number:	200811650283
Meter Form Factor:	Form 2S
Meter Class:	CL200
Rated Voltage (fixed or range):	240VAC
Mode & Monitoring:	Meter LCD Display
Modifications:	Series Test, none allowable

Test Conditions:

Environmental:	Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions):		
	21°C	32%	103 mBar			
Parametric:	Discharge Peak Voltage:	Source Impedance:	Discharge Peak Current:	Current Circuits Energization:	Current Circuits Current:	Voltage Circuits Energization:
	6 kVolt	2 Ohms	3 kAmperes	120 Vrms	0 Arms	120 Vrms

Test Results:

Discharge Mode and Lines *	1 discharges each polarity	Angular Injection @ 0 degrees Pass/Fail	Angular Injection @ 90 degrees Pass/Fail	Angular Injection @ 270 degrees Pass/Fail
Transverse Mode Line1 to Neutral	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Transverse Mode Line1 to Line 2	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Transverse Mode Line2 to Neutral	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass

Discharge Mode and Lines *	1 discharges each polarity	Angular Injection @ 0 degrees Pass/Fail	Angular Injection @ 90 degrees Pass/Fail	Angular Injection @ 270 degrees Pass/Fail
Common Mode Line 1 to Ground	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Common Mode Neutral to Ground	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Common Mode Line 2 to Ground	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Common Mode Line 1+ 2 + Neutral to PE	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass

Registration at Start:	Registration at End:
0.0 kWh	0.0 kWh
Perturbation Accrual	Meter functionality
0.000	No anomalies

Table 58. Test No. 17: Effect of High Voltage Surges – 1.2/50 µs Combination Wave, Form 2S, SN10283, Test Results

*Note: on certain form Factors, testing may be redundant for some Current or Voltage lines.

Test No. 17: Effect of High Voltage Surges – 1.2/50 µs Combination Wave, Form 2S, SN10285

Test date:	Wednesday, October 14, 2009
Test Engineer:	FC
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	C12.1
Setup Verification:	FC On 10/14/2009
Photo Filename:	Surge 27839 Comb Wave
Compliance Date:	10/14/2009

EUT Descriptor:	Watthour Meters
Model number:	Libra
Serial number:	200811650285
Meter Form Factor:	Form 2S
Meter Class:	CL200
Rated Voltage (fixed or range):	240VAC
Mode & Monitoring:	Meter LCD Display
Modifications:	Series Test, none allowable

Test Conditions:

Environmental:	Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions):		
	21°C	32%	103 mBar			
Parametric:	Discharge Peak Voltage:	Source Impedance:	Discharge Peak Current:	Current Circuits Energization:	Current Circuits Current:	Voltage Circuits Energization:
	6 kVolt	2 Ohms	3 kAmperes	120 Vrms	0 Arms	120 Vrms

Test Results:

Discharge Mode and Lines *	1 discharges each polarity	Angular Injection @ 0 degrees Pass/Fail	Angular Injection @ 90 degrees Pass/Fail	Angular Injection @ 270 degrees Pass/Fail
Transverse Mode Line1 to Neutral	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Transverse Mode Line1 to Line 2	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Transverse Mode Line2 to Neutral	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass

Discharge Mode and Lines *	1 discharges each polarity	Angular Injection @ 0 degrees Pass/Fail	Angular Injection @ 90 degrees Pass/Fail	Angular Injection @ 270 degrees Pass/Fail
Common Mode Line 1 to Ground	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Common Mode Neutral to Ground	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Common Mode Line 2 to Ground	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Common Mode Line 1+ 2 + Neutral to PE	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass

Registration at Start:	Registration at End:
0.0 kWh	0.0 kWh
Perturbation Accrual	Meter functionality
0.000	No anomalies

Table 59. Test No. 17: Effect of High Voltage Surges – 1.2/50 µs Combination Wave, Form 2S, SN10285, Test Results

*Note: on certain form Factors, testing may be redundant for some Current or Voltage lines.

Test No. 17: Effect of High Voltage Surges – 1.2/50 µs Combination Wave, Form 2S, SN10270

Test date:	Thursday, January 07, 2010
Test Engineer:	FC
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1:2008
Setup Verification:	FC On 1/7/2010
Photo Filename:	Surge 27839 Comb Wave
Compliance Date:	1/7/2010

EUT Descriptor:	Watthour Meters
Model number:	Libra
Serial number:	20081165010270
Meter Form Factor:	Form 2S
Meter Class:	CL200
Rated Voltage (fixed or range):	240VAC
Mode & Monitoring:	Meter LCD Display
Modifications:	Series Test, none allowable

Test Conditions:

Environmental:	Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions):		
	21°C	32%	103 mBar			
Parametric:	Discharge Peak Voltage:	Source Impedance:	Discharge Peak Current:	Current Circuits Energization:	Current Circuits Current:	Voltage Circuits Energization:
	6 kVolt	2 Ohms	3 kAmperes	120 Vrms	0 Arms	120 Vrms

Test Results:

Discharge Mode and Lines *	1 discharges each polarity	Angular Injection @ 0 degrees Pass/Fail	Angular Injection @ 90 degrees Pass/Fail	Angular Injection @ 270 degrees Pass/Fail
Transverse Mode Line1 to Neutral	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Transverse Mode Line1 to Line 2	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Transverse Mode Line2 to Neutral	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass

Discharge Mode and Lines *	1 discharges each polarity	Angular Injection @ 0 degrees Pass/Fail	Angular Injection @ 90 degrees Pass/Fail	Angular Injection @ 270 degrees Pass/Fail
Common Mode Line 1 to Ground	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Common Mode Neutral to Ground	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Common Mode Line 2 to Ground	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Common Mode Line 1+ 2 + Neutral to PE	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass

Registration at Start:	Registration at End:
0.0 kWh	0.0 kWh
Perturbation Accrual	Meter functionality
0.000	No anomalies

Table 60. Test No. 17: Effect of High Voltage Surges – 1.2/50 µs Combination Wave, Form 2S, SN10270, Test Results

*Note: on certain form Factors, testing may be redundant for some Current or Voltage lines.

Test No. 17: Effect of High Voltage Surges – 1.2/50 µs Combination Wave, Form 2S, SN10275

Test date:	Thursday, January 07, 2010
Test Engineer:	FC
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1:2008
Setup Verification:	FC On 1/7/2010
Photo Filename:	Surge 27839 Comb Wave
Compliance Date:	1/7/2010

EUT Descriptor:	Watthour Meters
Model number:	Libra
Serial number:	20081165010275
Meter Form Factor:	Form 2S
Meter Class:	CL200
Rated Voltage (fixed or range):	240VAC
Mode & Monitoring:	Meter LCD Display
Modifications:	Series Test, none allowable

Test Conditions:

Environmental:	Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions):		
	19°C	21%	103 mBar			
Parametric:	Discharge Peak Voltage:	Source Impedance:	Discharge Peak Current:	Current Circuits Energization:	Current Circuits Current:	Voltage Circuits Energization:
	6 kVolt	2 Ohms	3 kAmperes	120 Vrms	0 Arms	120 Vrms

Test Results:

Discharge Mode and Lines *	1 discharges each polarity	Angular Injection @ 0 degrees Pass/Fail	Angular Injection @ 90 degrees Pass/Fail	Angular Injection @ 270 degrees Pass/Fail
Transverse Mode Line1 to Neutral	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Transverse Mode Line1 to Line 2	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Transverse Mode Line2 to Neutral	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass

Discharge Mode and Lines *	1 discharges each polarity	Angular Injection @ 0 degrees Pass/Fail	Angular Injection @ 90 degrees Pass/Fail	Angular Injection @ 270 degrees Pass/Fail
Common Mode Line 1 to Ground	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Common Mode Neutral to Ground	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Common Mode Line 2 to Ground	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Common Mode Line 1+ 2 + Neutral to PE	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass

Registration at Start:	Registration at End:
0.0 kWh	0.0 kWh
Perturbation Accrual	Meter functionality
0.000	No anomalies

Table 61. Test No. 17: Effect of High Voltage Surges – 1.2/50 µs Combination Wave, Form 2S, SN10275, Test Results

*Note: on certain form Factors, testing may be redundant for some Current or Voltage lines.

Test No. 17: Effect of High Voltage Line Surges – 1.2/50 µs Combination Wave Test Setup

Photograph 19. Test No. 17: Effect of High Voltage Line Surges– 1.2/50 µs Combination Wave, Test Setup

Test No. 17: Effect of High Voltage Surges – 100 kHz Ring Wave, Form 2S, SN10268

Test date:	Friday, January 08, 2010
Test Engineer:	ZT
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1:2008
Setup Verification:	ZT On 1/8/2010
Photo Filename:	Test #17(b), Surge
Compliance Date:	1/8/2010

EUT Descriptor:	Meters
Model number:	Libra TA30 kh1.0
Serial number:	20081165010268
Meter Form Factor:	2S
Meter Class:	CL200
Rated Voltage (fix or range):	240VAC
Mode & Monitoring:	Meter LCD Display
Modifications:	Series Test, none allowable

Test Conditions:

Environmental:	Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions):		
	20°C	21%	101.4mBar			
Parametric:	Discharge Peak Voltage:	Source Impedance:	Discharge Peak Current:	Current Circuits Energization:	Current Circuits Current:	Voltage Circuits Energization:
	6kVolt	12 Ohms	500Amperes	120Vrms	0Arms	120Vrms

Test Results:

Discharge Mode and Lines *	Min. 5 discharges each polarity	Angular Injection @ 0 degrees Pass/Fail	Angular Injection @ 90 degrees Pass/Fail	Angular Injection @ 270 degrees Pass/Fail
Transverse Mode Line1 to Neutral	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Transverse Mode Line1 to Line 2	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Transverse Mode Line2 to Neutral	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass

Registration at Start:	Registration at End:
0.0 kWh	0.0 kWh
Perturbation Accrual	Meter functionality
0.00	No anomalies

Discharge Mode and Lines *	Min. 5 discharges each polarity	Angular Injection @ 0 degrees Pass/Fail	Angular Injection @ 90 degrees Pass/Fail	Angular Injection @ 270 degrees Pass/Fail
Common Mode Line 1 to Ground	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Common Mode Neutral to Ground	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Common Mode Line 2 to Ground	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Common Mode Line 1+ 2 + Neutral to PE	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass

Table 62. Test No. 17: Effect of High Voltage Surges – 100 kHz Ring Wave, Form 2S, SN10268, Test Results

*Note: on certain form Factors, testing may be redundant for some Current or Voltage lines.

Test No. 17: Effect of High Voltage Surges – 100 kHz Ring Wave, Form 2S, SN10270

Test date:	Friday, January 08, 2010
Test Engineer:	ZT
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1:2008
Setup Verification:	ZT On 1/8/2010
Photo Filename:	Test #17(b), Surge
Compliance Date:	1/8/2010

EUT Descriptor:	Meters
Model number:	Libra TA30 kh1.0
Serial number:	20081165010270
Meter Form Factor:	2S
Meter Class:	CL200
Rated Voltage (fix or range):	240VAC
Mode & Monitoring:	Meter LCD Display
Modifications:	Series Test, none allowable

Test Conditions:

Environmental:	Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions):		
	20°C	21%	101.4mBar			
Parametric:	Discharge Peak Voltage:	Source Impedance:	Discharge Peak Current:	Current Circuits Energization:	Current Circuits Current:	Voltage Circuits Energization:
	6kVolt	12 Ohms	500Amperes	120Vrms	0Arms	120Vrms

Test Results:

Discharge Mode and Lines *	Min. 5 discharges each polarity	Angular Injection @ 0 degrees Pass/Fail	Angular Injection @ 90 degrees Pass/Fail	Angular Injection @ 270 degrees Pass/Fail
Transverse Mode Line1 to Neutral	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Transverse Mode Line1 to Line 2	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Transverse Mode Line2 to Neutral	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass

Registration at Start:	Registration at End:
0.0 kWh	0.0 kWh
Perturbation Accrual	Meter functionality
0.00	No anomalies

Discharge Mode and Lines *	Min. 5 discharges each polarity	Angular Injection @ 0 degrees Pass/Fail	Angular Injection @ 90 degrees Pass/Fail	Angular Injection @ 270 degrees Pass/Fail
Common Mode Line 1 to Ground	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Common Mode Neutral to Ground	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Common Mode Line 2 to Ground	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Common Mode Line 1+ 2 + Neutral to PE	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass

Table 63. Test No. 17: Effect of High Voltage Surges – 100 kHz Ring Wave, Form 2S, SN10270, Test Results

*Note: on certain form Factors, testing may be redundant for some Current or Voltage lines.

Test No. 17: Effect of High Voltage Surges – 100 kHz Ring Wave, Form 2S, SN10275

Test date:	Friday, January 08, 2010
Test Engineer:	ZT
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1:2008
Setup Verification:	ZT On 1/8/2010
Photo Filename:	Test #17(b), Surge
Compliance Date:	1/8/2010

EUT Descriptor:	Meters
Model number:	Libra TA30 kh1.0
Serial number:	20081165010275
Meter Form Factor:	2S
Meter Class:	CL200
Rated Voltage (fix or range):	240VAC
Mode & Monitoring:	Meter LCD Display
Modifications:	Series Test, none allowable

Test Conditions:

Environmental:	Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions):		
	20°C	21%	101.4mBar			
Parametric:	Discharge Peak Voltage:	Source Impedance:	Discharge Peak Current:	Current Circuits Energization:	Current Circuits Current:	Voltage Circuits Energization:
	6kVolt	12 Ohms	500Amperes	120Vrms	0Arms	120Vrms

Test Results:

Discharge Mode and Lines *	Min. 5 discharges each polarity	Angular Injection @ 0 degrees Pass/Fail	Angular Injection @ 90 degrees Pass/Fail	Angular Injection @ 270 degrees Pass/Fail
Transverse Mode Line1 to Neutral	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Transverse Mode Line1 to Line 2	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Transverse Mode Line2 to Neutral	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass

Registration at Start:	Registration at End:
0.0 kWh	0.0 kWh
Perturbation Accrual	Meter functionality
0.00	No anomalies

Discharge Mode and Lines *	Min. 5 discharges each polarity	Angular Injection @ 0 degrees Pass/Fail	Angular Injection @ 90 degrees Pass/Fail	Angular Injection @ 270 degrees Pass/Fail
Common Mode Line 1 to Ground	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Common Mode Neutral to Ground	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Common Mode Line 2 to Ground	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass
Common Mode Line 1+ 2 + Neutral to PE	positive	Pass	Pass	Pass
	negative	Pass	Pass	Pass

Table 64. Test No. 17: Effect of High Voltage Surges – 100 kHz Ring Wave, Form 2S, SN10275, Test Results

*Note: on certain form Factors, testing may be redundant for some Current or Voltage lines.

Test No. 17: Effect of High Voltage Line Surges – 100 kHz Ring Wave Test Setup

Photograph 20. Test No. 17: Effect of High Voltage Line Surges– 100 kHz Ring Wave, Test Setup

Test No. 18: Effect of External Magnetic Field

Test Requirement(s): **ANSI C12.1 4.7.3.4** The change produced in the performance of a metering device shall not exceed the specified maximum deviation when subjected to a 100 ampere-turn external magnetic field . The maximum deviation is specified in *ANSI C12.20 Table 17*.

Test Procedures: The test was performed in an environmentally controlled shielded chamber. The meter was mounted on a special test stand in close proximity to the inducer coil; it was energized at rated voltage and frequency and its current circuits are lightly loaded with a current as specified by ANSI C12.1:2001, paragraph 4.7.3.4 table 21.

After completion of the physical set-up, an initial Reference Performance test-run was taken with *no magnetic field applied*, in order to obtain a reference time for the proposed accumulator increment.

Thereafter, the magnetic field was applied and the time accrued for the same accumulator increment was compared with the Reference Performance time; the resulting variance was recorded for final analysis.

The meter was exposed to magnetic fields penetrating its volume along all three orthogonal axis (ANSI defines it as Conditions 1, 2 and 3). In all cases, the inducer loop was maintained at a distance of 10 inches from the volumetric center of the meter and the magnetic field strength was held to a level of 100 A/m*turn as measured at a position equivalent to this volumetric center with the Gaussmeter probe held normal to the direction of the lines of force in effect.

The test was run four times, one for the Reference Performance and the three orthogonal field vector directions, and was repeated for all three current circuit lines.

At the completion of the test, the percentile deviation was calculated from the largest gathered variance from Reference Performance time.

Test Results: The EUT was compliant with the requirement of this Section.

Test Engineer(s): Aldo della Coletta

Test Date(s): 01/27/10

Test No. 18: Effect of External Magnetic Field, Form 2S, SN10293

Test date:	Tuesday, February 16, 2010
Test Engineer:	ADC
Metrak # :	27839
Customer:	Wasion Group. Ltd.
Specifications:	ANSI C12.20-2002
Setup Verification:	2/16/2010
Photo Filename:	Test #18 setup
Compliance Date:	2/16/2010

EUT Descriptor:	Electric Meter
Model number:	type Libra
Serial number:	10293
Meter Form Factor:	2S
Meter Class:	CL200 - CA 0.5
Rated Voltage (fix or range):	240V
Test Mode & Monitoring:	Kth interims
Modifications:	None pertinent

Test Conditions:

Environmental:	**Temperature:**	**Relative Humidity:**	**Barometric Pressure**	**Others (Specifically Required Conditions):** None	
	24°C	38%	1022mBar		
Parametric:	**AC Circuits**	**Field Strength at EUT center**	**Separation from field inducer**	**Test current (per element)**	**Number of kth sequences**
		100 A/m turn	10 inches	3 Amperes	10

Test Results:

Exposure conditions	Total Current equally shared by elements		
	Gross accuracy error, deviation from Standard meter - comparator, in percents	Deviation under magnetic perturbation, in percents	Net deviation from Reference, in percents
Reference performance	+ 0.18	N/A	N/A
ANSI Condition 1) lines of force on Z orthogonal axis	N/A	+ 0.2	+ 0.02
ANSI Condition 2) lines of force on X orthogonal axis	N/A	+ 0.19	+ 0.01
ANSI Condition 3) lines of force on Y orthogonal axis	N/A	+ 0.12	- 0.06

Maximum Deviation		**Notes and Description of Anomalies**
Axis of Max. Perturbation	Magnetic susceptibility on Y axis appears to be the highest. Very small standard deviations.	Magnetic susceptibility on Y axis appears to be the highest. Very small standard deviations.
Percentile of Deviation	-0.06%	**Pass or Fail**
Error confidence (+/-)	2E-5	Pass

Table 65. Test No. 18: Effect of External Magnetic Field, Form 2S, SN10293, Test Results

Test No. 18: Effect of External Magnetic Field, Form 2S, SN10294

Test date:	Tuesday, February 16, 2010
Test Engineer:	ADC
Metrak # :	27839
Customer:	Wasion Group. Ltd.
Specifications:	ANSI C12.20-2002
Setup Verification:	2/16/2010
Photo Filename:	Test #18 setup
Compliance Date:	2/16/2010

EUT Descriptor:	Electric Meter
Model number:	type Libra
Serial number:	10294
Meter Form Factor:	2S
Meter Class:	CL200 - CA 0.5
Rated Voltage (fix or range):	240V
Test Mode & Monitoring:	Kth interims
Modifications:	None pertinent

Test Conditions:

Environmental:	**Temperature:**	**Relative Humidity:**	**Barometric Pressure**	**Others (Specifically Required Conditions):** None	
	24°C	38%	1022mBar		
Parametric:	**AC Circuits**	**Field Strength at EUT center**	**Separation from field inducer**	**Test current (per element)**	**Number of kth sequences**
		100 A/m turn	10 inches	3 Amperes	10

Test Results:

Exposure conditions	Total Current equally shared by elements		
	Gross accuracy error, deviation from Standard meter - comparator, in percents	Deviation under magnetic perturbation, in percents	Net deviation from Reference, in percents
Reference performance	+ 0.12	N/A	N/A
ANSI Condition 1) lines of force on Z orthogonal axis	N/A	+ 0.13	+ 0.01
ANSI Condition 2) lines of force on X orthogonal axis	N/A	+ 0.13	+ 0.01
ANSI Condition 3) lines of force on Y orthogonal axis	N/A	+ 0.05	- 0.07

Maximum Deviation		**Notes and Description of Anomalies**
Axis of Max. Perturbation	Y	Magnetic susceptibility on Y axis appears to be the highest. Very small standard deviations.
Percentile of Deviation	-0.07%	**Pass or Fail**
Error confidence (+/-)	2E-5	Pass

Table 66. Test No. 18: Effect of External Magnetic Field, Form 2S, SN10294, Test Results

Test No. 18: Effect of External Magnetic Field, Form 2S, SN10295

Test date:	Tuesday, February 16, 2010
Test Engineer:	ADC
Metrak # :	27839
Customer:	Wasion Group. Ltd.
Specifications:	ANSI C12.20-2002
Setup Verification:	2/16/2010
Photo Filename:	Test #18 setup
Compliance Date:	2/16/2010

EUT Descriptor:	Electric Meter
Model number:	type Libra
Serial number:	10295
Meter Form Factor:	2S
Meter Class:	CL200 - CA 0.5
Rated Voltage (fix or range):	240V
Test Mode & Monitoring:	Kth interims
Modifications:	None pertinent

Test Conditions:

Environmental:	**Temperature:**	**Relative Humidity:**	**Barometric Pressure**	**Others (Specifically Required Conditions):** None	
	24°C	38%	1022mBar		
Parametric:	**AC Circuits**	**Field Strength at EUT center**	**Separation from field inducer**	**Test current (per element)**	**Number of kth sequences**
		100 A/m turn	10 inches	3 Amperes	10

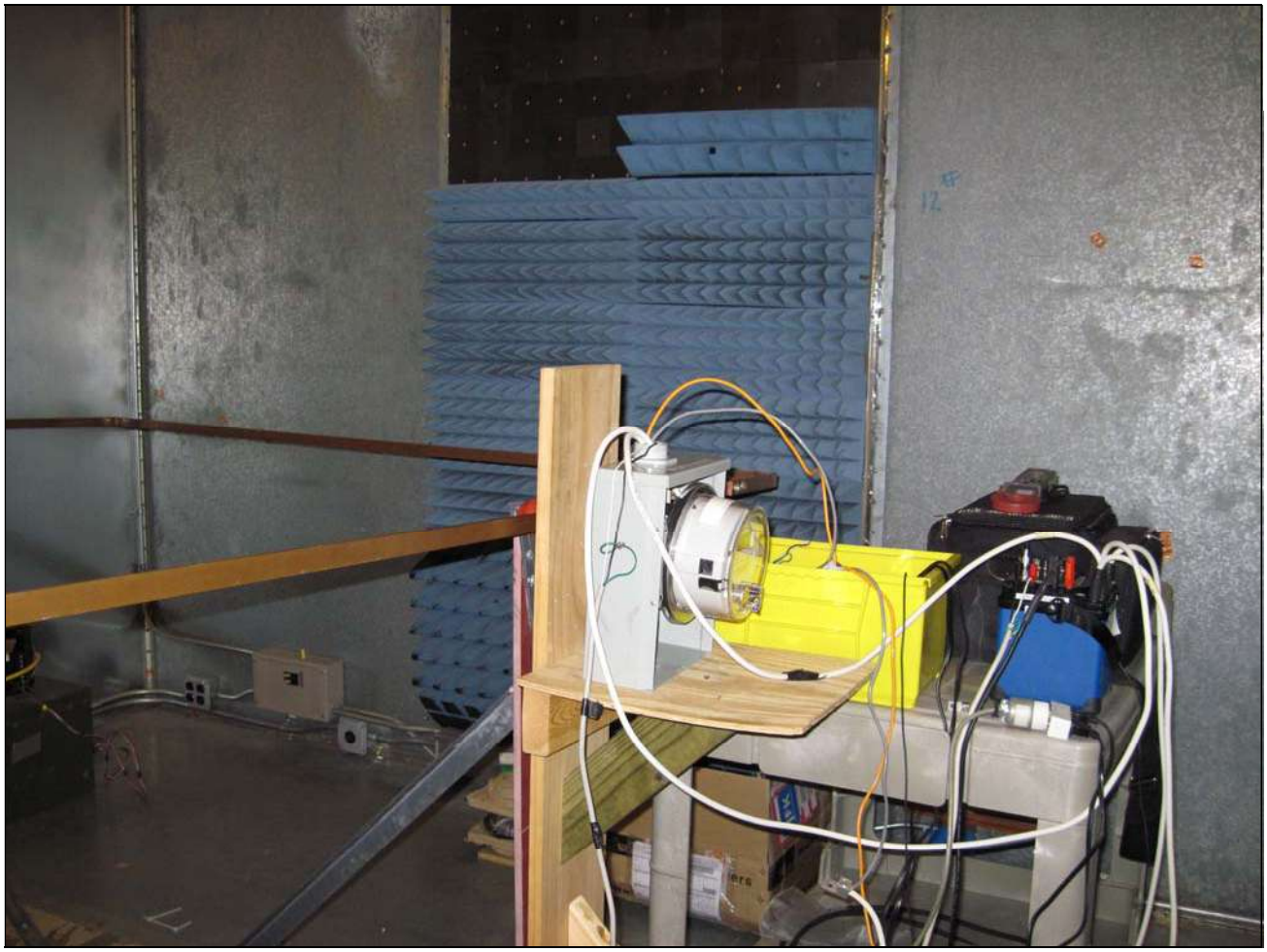
Test Results:

Exposure conditions	Total Current equally shared by elements		
	Gross accuracy error, deviation from Standard meter - comparator, in percents	Deviation under magnetic perturbation, in percents	Net deviation from Reference, in percents
Reference performance	+ 0.06	N/A	N/A
ANSI Condition 1) lines of force on Z orthogonal axis	N/A	+ 0.11	+ 0.05
ANSI Condition 2) lines of force on X orthogonal axis	N/A	+ 0.11	+ 0.05
ANSI Condition 3) lines of force on Y orthogonal axis	N/A	- 0.01	- 0.07

Maximum Deviation		**Notes and Description of Anomalies**
Axis of Max. Perturbation	Y	Magnetic susceptibility on Y axis appears to be the highest. Very small deviations.
Percentile of Deviation	-0.07%	**Pass or Fail**
Error confidence (+/-)	2E-5	Pass

Table 67. Test No. 18: Effect of External Magnetic Field, Form 2S, SN10295, Test Results

Test No. 18: Effect of External Magnetic Field Test Setup



Photograph 21. Test No. 18: Effect of External Magnetic Field, Test Setup – 1

Photograph 22. Test No. 18: Effect of External Magnetic Field, Test Setup – 2

Test No. 19: Effects of Variation of Ambient Temperature

Test Requirement(s): This test shall be applied to a minimum of three meters. The meters shall be placed in a space with a temperature of 23°C ± 5°C and allowed to stand for no less than 2 hours with the voltage circuits of the meters energized. Reference performance at each of the loads specified in Table 16 of ANSI C12.20-2002 shall be obtained after operating the meters for 1 hour at the specified load. The meters shall then be operated and tested at each of the following conditions:

a) Conditions (1) through (6): These tests shall be conducted by placing the meter in a space with a temperature of 50°C ± 5°C. After energizing the voltage circuits of the meters for no less than 2 hours, the appropriate test currents at the power factors listed for conditions (1) through (6) of Table 16 shall be sequentially applied to the meters. Each condition shall be maintained for a period of at least 1 hour before performing tests to determine the deviation from reference performance.

b) Conditions (7) through (12): Repeat conditions (1) through (6), respectively, but place meters in a space with a temperature of -20°C ± 5°C. The effect of variation of temperature upon the performance of the meters shall not exceed that specified in Table 114.

Condition	Current in Amperes						Power Factor	Ambient Temperature	Max. Deviation in % from Reference Performance at Nominal Temperature Difference*	
	Current Class								Accuracy Class	
	2	10	20	100	200	320			0.5	0.2
Reference performance for conditions (1) & (7)	0.025	0.25	0.25	1.5	3	5	1.0	23°C±5°C	Reference	Reference
Reference performance for conditions (2) & (8)	0.25	2.5	2.5	15	30	50	1.0	23°C±5°C	Reference	Reference
Reference performance for conditions (3) & (9)	1	5	10	50	100	150	1.0	23°C±5°C	Reference	Reference
Reference performance for conditions (4) & (10)	0.05	0.5	0.5	3	6	10	0.5 lag	23°C±5°C	Reference	Reference
Reference performance for conditions (5) & (11)	0.25	2.5	2.5	15	30	50	0.5 lag	23°C±5°C	Reference	Reference
Reference performance for conditions (6) & (12)	1	5	10	50	100	150	0.5 lag	23°C±5°C	Reference	Reference
Condition (1)	0.025	0.25	0.25	1.5	3	5	1.0	50°C±5°C	±0.8	±0.3
Condition (2)	0.25	2.5	2.5	15	30	50	1.0	50°C±5°C	±0.8	±0.3
Condition (3)	1	5	10	50	100	150	1.0	50°C±5°C	±0.8	±0.3
Condition (4)	0.05	0.5	0.5	3	6	10	0.5 lag	50°C±5°C	±1.4	±0.5
Condition (5)	0.25	2.5	2.5	15	30	50	0.5 lag	50°C±5°C	±1.4	±0.5
Condition (6)	1	5	10	50	100	150	0.5 lag	50°C±5°C	±1.4	±0.5
Condition (7)	0.025	0.25	0.25	1.5	3	5	1.0	-20°C±5°C	±1.3	±0.5
Condition (8)	0.25	2.5	2.5	15	30	50	1.0	-20°C±5°C	±1.3	±0.5
Condition (9)	1	5	10	50	100	150	1.0	-20°C±5°C	±1.3	±0.5
Condition (10)	0.05	0.5	0.5	3	6	10	0.5 lag	-20°C±5°C	±2.1	±0.9
Condition (11)	0.25	2.5	2.5	15	30	50	0.5 lag	-20°C±5°C	±2.1	±0.9
Condition (12)	1	5	10	50	100	150	0.5 lag	-20°C±5°C	±2.1	±0.9

Table 68. Effects of Variation of Ambient Temperature

Test Results: The EUT was compliant with the requirement of this Section.

Test Engineer(s): William Murphy

Test Date(s): 10/14/09 to 03/12/10

Test No. 19: Effect of Variation of Ambient Temperature

S/N: x296 Class: 200 FM: 2S						
	temp	**Power Factor**	**class 200**	**% reg**	**deviation**	**limit**
reference	23 C+/- 5C	1	3	99.998	reference	reference
reference	23 C+/- 5C	1	30	100.001	reference	reference
reference	23 C+/- 5C	1	100	99.985	reference	reference
reference	23 C+/- 5C	0.5	6	99.982	reference	reference
reference	23 C+/- 5C	0.5	30	99.988	reference	reference
reference	23 C+/- 5C	0.5	100	100.009	reference	reference
Condition 1	50 C+/-5C	1	3	99.912	-0.086	+/- 0.8
Condition 2	50 C+/-5C	1	30	99.933	-0.068	+/- 0.8
Condition 3	50 C+/-5C	1	100	99.911	-0.074	+/- 0.8
Condition 4	50 C+/-5C	0.5	6	99.902	-0.08	+/- 1.4
Condition 5	50 C+/-5C	0.5	30	99.955	-0.033	+/- 1.4
Condition 6	50 C+/-5C	0.5	100	99.934	-0.075	+/- 1.4
Condition 7	-20 C+/-5C	1	3	100.012	0.014	+/- 1.3
Condition 8	-20 C+/-5C	1	30	99.967	-0.034	+/- 1.3
Condition 9	-20 C+/-5C	1	100	99.988	0.003	+/- 1.3
Condition 10	-20 C+/-5C	0.5	6	99.986	0.004	+/- 2.1
Condition 11	-20 C+/-5C	0.5	30	99.991	0.003	+/- 2.1
Condition 12	-20 C+/-5C	0.5	100	99.994	-0.015	+/- 2.1

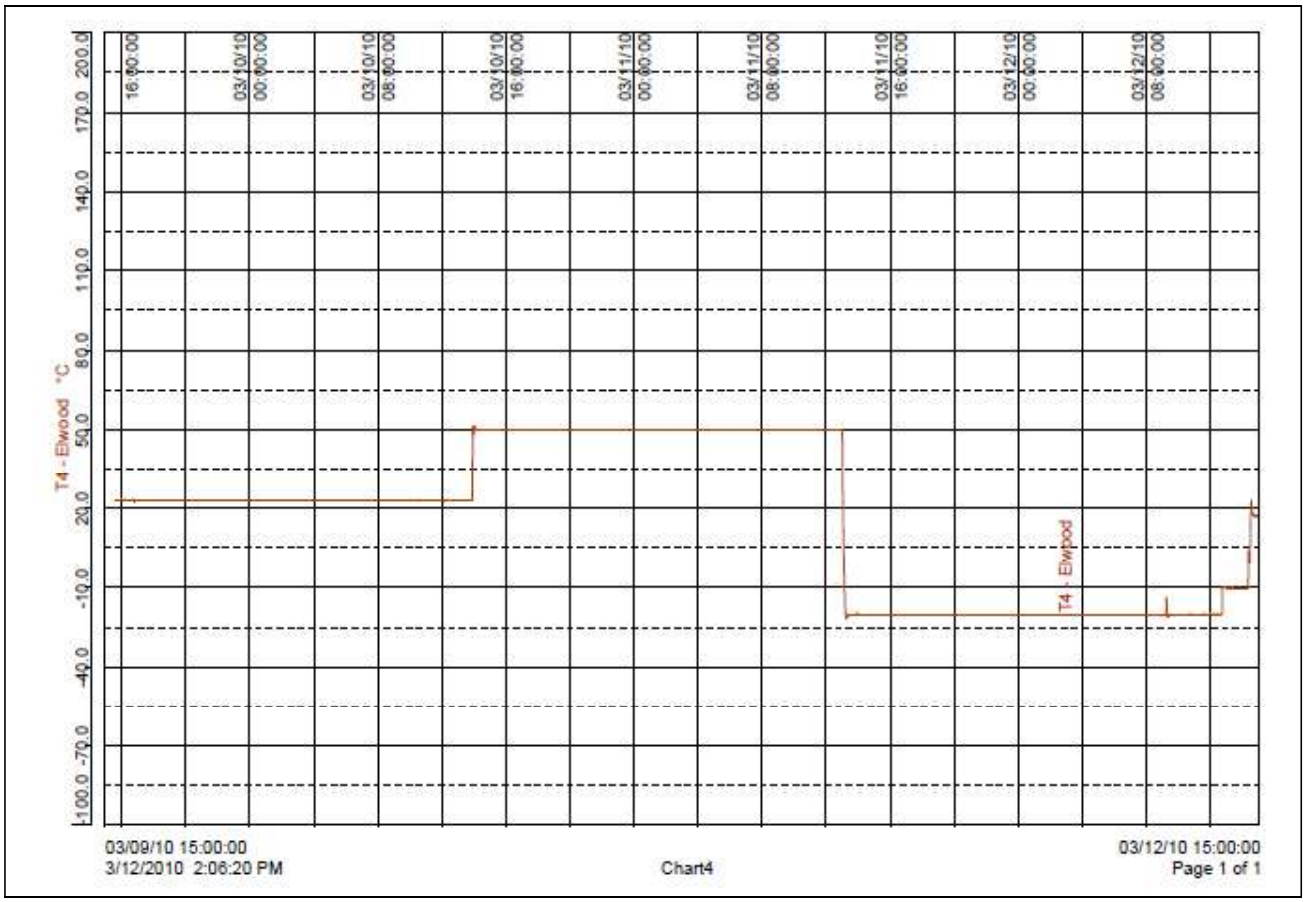
Table 69. Test No. 19: Effects of Variation of Ambient Temperature, Form 2S, Meter Serial No. 10296, Test Results

S/N: x297 Class: 200 FM: 2S						
	temp	**Power Factor**	**class 200**	**% reg**	**deviation**	**limit**
reference	23 C+/- 5C	1	3	100.005	reference	reference
reference	23 C+/- 5C	1	30	100.021	reference	reference
reference	23 C+/- 5C	1	100	99.989	reference	reference
reference	23 C+/- 5C	0.5	6	99.988	reference	reference
reference	23 C+/- 5C	0.5	30	100.004	reference	reference
reference	23 C+/- 5C	0.5	100	100.022	reference	reference
Condition 1	50 C+/-5C	1	3	99.955	-0.050	+/- 0.8
Condition 2	50 C+/-5C	1	30	99.921	-0.100	+/- 0.8
Condition 3	50 C+/-5C	1	100	99.990	0.001	+/- 0.8
Condition 4	50 C+/-5C	0.5	6	99.971	-0.017	+/- 1.4
Condition 5	50 C+/-5C	0.5	30	99.985	-0.019	+/- 1.4
Condition 6	50 C+/-5C	0.5	100	99.997	-0.025	+/- 1.4
Condition 7	-20 C+/-5C	1	3	99.999	-0.006	+/- 1.3
Condition 8	-20 C+/-5C	1	30	100.071	0.0500	+/- 1.3
Condition 9	-20 C+/-5C	1	100	100.005	0.016	+/- 1.3
Condition 10	-20 C+/-5C	0.5	6	99.913	-0.075	+/- 2.1
Condition 11	-20 C+/-5C	0.5	30	99.989	-0.015	+/- 2.1
Condition 12	-20 C+/-5C	0.5	100	100.041	0.019	+/- 2.1

Table 70. Test No. 19: Effects of Variation of Ambient Temperature, Form 2S, Meter Serial No. 10297, Test Results

S/N: x298 Class: 200 FM: 2S						
	temp	**Power Factor**	**class 200**	**% reg**	**deviation**	**limit**
reference	23 C+/- 5C	1	3	100.042	reference	reference
reference	23 C+/- 5C	1	30	99.999	reference	reference
reference	23 C+/- 5C	1	100	99.998	reference	reference
reference	23 C+/- 5C	0.5	6	99.99	reference	reference
reference	23 C+/- 5C	0.5	30	99.995	reference	reference
reference	23 C+/- 5C	0.5	100	99.995	reference	reference
Condition 1	50 C+/-5C	1	3	99.982	-0.060	+/- 0.8
Condition 2	50 C+/-5C	1	30	99.989	-0.010	+/- 0.8
Condition 3	50 C+/-5C	1	100	99.941	-0.057	+/- 0.8
Condition 4	50 C+/-5C	0.5	6	99.989	-0.001	+/- 1.4
Condition 5	50 C+/-5C	0.5	30	99.991	-0.004	+/- 1.4
Condition 6	50 C+/-5C	0.5	100	100.014	0.019	+/- 1.4
Condition 7	-20 C+/-5C	1	3	99.995	-0.047	+/- 1.3
Condition 8	-20 C+/-5C	1	30	100.000	0.001	+/- 1.3
Condition 9	-20 C+/-5C	1	100	99.945	-0.053	+/- 1.3
Condition 10	-20 C+/-5C	0.5	6	100.012	0.022	+/- 2.1
Condition 11	-20 C+/-5C	0.5	30	99.998	0.003	+/- 2.1
Condition 12	-20 C+/-5C	0.5	100	99.999	0.004	+/- 2.1

Table 71. Test No. 19: Effects of Variation of Ambient Temperature, Form 2S, Meter Serial No. 10298, Test Results



Plot 1. Ambient Temperature Data

Test No. 19: Effect of Variation of Ambient Temperature Test Setup

Photograph 23. Test No. 19: Effect of Variation of Ambient Temperature, Test Setup

Test No. 20: Effect of Temporary Overloads

Test Requirement(s): Self-contained meters shall be subjected to a short-circuit current of 7000 A peak, 60 Hz, for not less than one cycle or no more than 6 cycles (0.1 second). For this test, current circuits of the meter shall be connected series adding. The effect of a short-circuit current on the performance of a meter should not exceed that specified in Table 72. In order to eliminate residual effect, it is essential that tests of condition (1) be conducted before tests of condition (2).

Condition	Current in Amperes			Maximum Deviation in Percent from Reference Performance	
	Current Class			Accuracy Class	
	100	200	320	0.5	0.2
Reference performance for condition (1)	15	30	50	Reference	Reference
Reference performance for condition (2)	1.5	3	5	Reference	Reference
Condition (1)	15	30	50	±0.1	±0.1
Condition (2)	1.5	3	5	±0.1	±0.1

Table 72. Effect of Temporary Overloads

Test Results: The EUT was compliant with the requirement of this Section.

Test Engineer(s): William Murphy

Test Date(s): 10/14/09 to 02/17/10

Test No. 20: Effect of Temporary Overloads, 5.5.3.7.1

Test: Performance Verification Customer: Waison Model: Libra S/N: x271 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839						
volt	**amp**	**phase_angle**	**freq**	**% reg**	**deviation**	**limit**
240V	30	0	60	99.975		Reference
240V	3	0	60	100.026		Reference
240V	30	0	60	99.979	0.004	+/- 0.1
240V	3	0	60	100.008	-0.0180	+/- 0.1

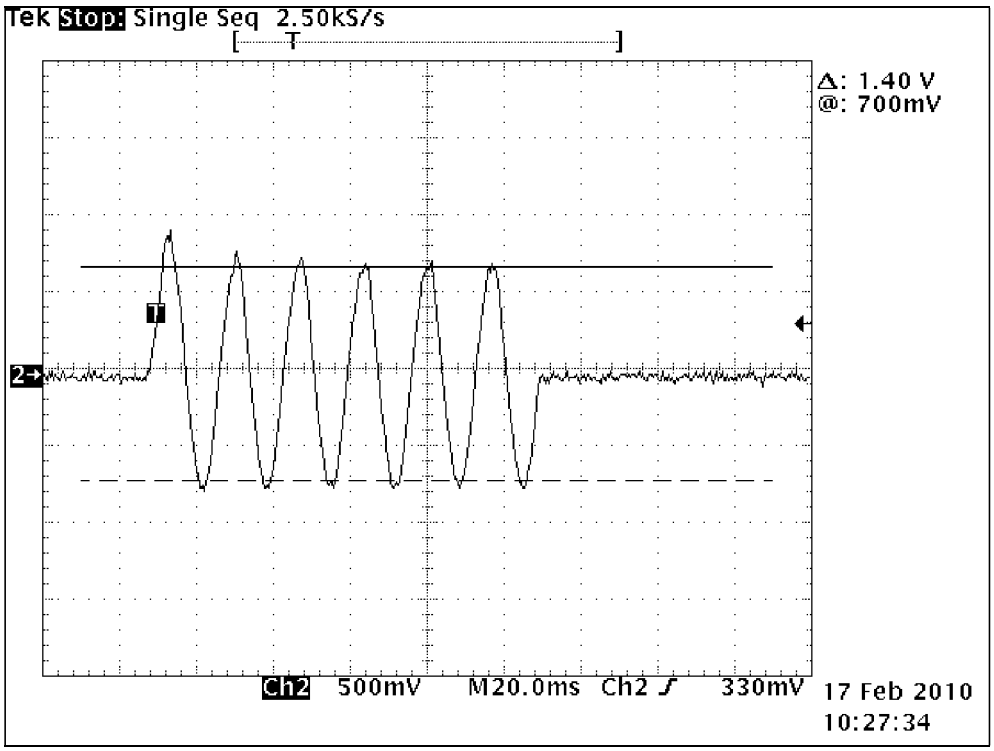
Table 73. Test No. 20: Effect of Temporary Overloads, 5.5.3.7.1, Form 2S, Meter Serial No. 10271, Test Results

Test: Performance Verification Customer: Waison Model: Libra S/N: x268 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839						
volt	**amp**	**phase_angle**	**freq**	**% reg**	**deviation**	**limit**
240V	30	0	60	99.929		Reference
240V	3	0	60	99.941		Reference
240V	30	0	60	99.913	-0.016	+/- 0.1
240V	3	0	60	99.945	0.0045	+/- 0.1

Table 74. Test No. 20: Effect of Temporary Overloads, 5.5.3.7.1, Form 2S, Meter Serial No. 10268, Test Results

Test: Performance Verification Customer: Waison Model: Libra S/N: x275 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839						
volt	**amp**	**phase_angle**	**freq**	**% reg**	**deviation**	**limit**
240V	30	0	60	99.933		Reference
240V	3	0	60	99.936		Reference
240V	30	0	60	99.9295	-0.004	+/- 0.1
240V	3	0	60	99.9430	0.0075	+/- 0.1

Table 75. Test No. 20: Effect of Temporary Overloads, 5.5.3.7.1, Form 2S, Meter Serial No. 10275, Test Results



Plot 2. Test No. 20: Effect of Temporary Overloads, 5.5.3.7.1, 7000A Peak

Photograph 24. Test No. 20: Effect of Temporary Overloads, 5.5.3.7.1, 7000A Peak, Overcurrent

Test No. 20: Effect of Temporary Overloads, 5.5.3.7.1, Test Setup

Photograph 25. Test No. 20: Effect of Temporary Overloads, 5.5.3.7.1, Test Setup

Test No. 20: Effect of Temporary Overloads, 5.5.3.7.2

Test: 5.5.3.7.2 Effect on mechanical structure and insulation Customer: Waison Model: Libra S/N: x271 Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839				
5.5.3.7.2 Effect on Mechanical Structure Requirement			**Class/Over Current**	**Result**
The meter shall withstand, for a duration of 4 cycles at nominal power line frequency, a symmetrical fault current without damage to the mechanical l structure or reduction in the insulation.			200 / 12, 000A	Metering device shows no signs of physical damage as a result of the test procedure.
Insulation test	**Position**	**Limit**	**Leakage Current**	**Result**
2.5kV	Line 1 to ground	5 mA	0.008 mA	Pass
2.5kV	Line 2 to ground	5 mA	0.008 mA	Pass
*Test Unit passes the Insulation test at 2.5 kVrms, 60 Hz for 1 minute. Since the test unit passes at this higher 2.5 kVrms level, the 1.5 kVrms, 60 Hz for 1 minute is unnecessary.				

Table 76. Test No. 20: Effect of Temporary Overloads, 5.5.3.7.2, Form 2S, Meter Serial No. 10271, Test Results

Test: 5.5.3.7.2 Effect on mechanical structure and insulation
Customer: Waison
Model: Libra
S/N: x268
Meter Form: 2S
Meter Class: 200
Voltage: 240V
Job Number: 27839

5.5.3.7.2 Effect on Mechanical Structure Requirement	Class/Over Current	Result
The meter shall withstand, for a duration of 4 cycles at nominal power line frequency, a symmetrical fault current without damage to the mechanical structure or reduction in the insulation	200 / 12, 000A	Metering device shows no signs of physical damage as a result of the test procedure.

Insulation test	Position	Limit	Leakage Current	Result
2.5kV	Line 1 to ground	5 mA	0.008 mA	Pass
2.5kV	Line 2 to ground	5 mA	0.008 mA	Pass

*Test Unit passes the Insulation test at 2.5 kVrms, 60 Hz for 1 minute. Since the test unit passes at this higher 2.5 kVrms level, the 1.5 kVrms , 60 Hz for 1 minute is unnecessary.

Table 77. Test No. 20: Effect of Temporary Overloads, 5.5.3.7.2, Form 2S, Meter Serial No. 10268, Test Results

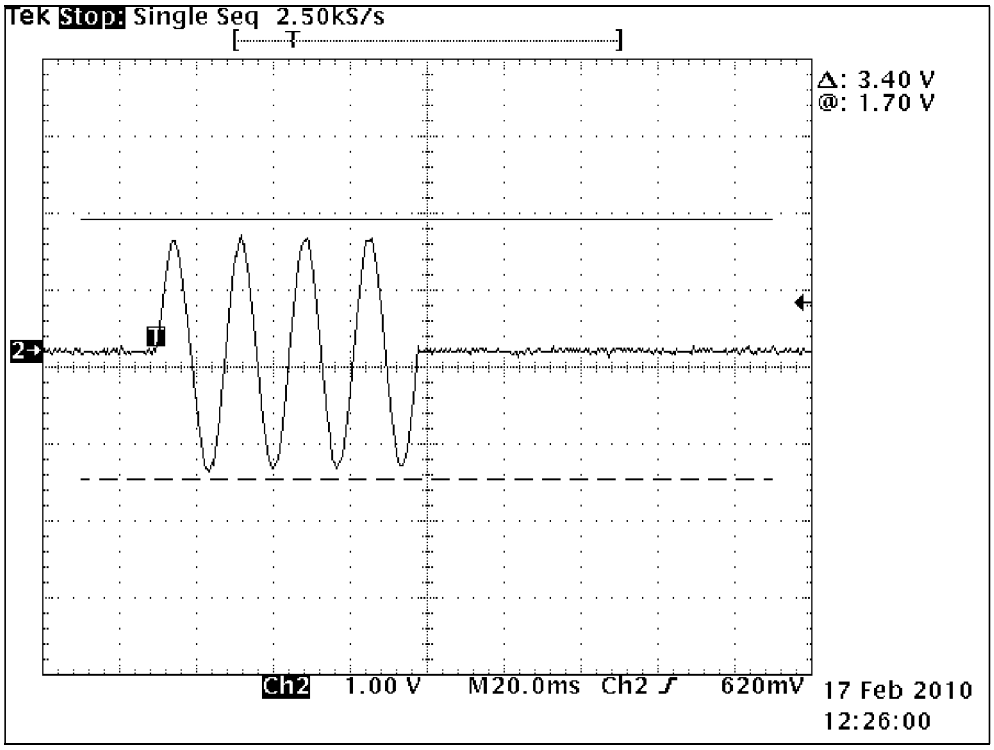
Test: 5.5.3.7.2 Effect on mechanical structure and insulation
Customer: Waison
Model: Libra
S/N: x275
Meter Form: 2S
Meter Class: 200
Voltage: 240V
Job Number: 27839

5.5.3.7.2 Effect on Mechanical Structure Requirement	Class/Over Current	Result
The meter shall withstand, for a duration of 4 cycles at nominal power line frequency, a symmetrical fault current without damage to the mechanical structure or reduction in the insulation	200 / 12, 000A	Metering device shows no signs of physical damage as a result of the test procedure.

Insulation test	Position	Limit	Leakage Current	Result
2.5kV	Line 1 to ground	5 mA	0.006 mA	Pass
2.5kV	Line 2 to ground	5 mA	0.008 mA	Pass

*Test Unit passes the Insulation test at 2.5 kVrms, 60 Hz for 1 minute. Since the test unit passes at this higher 2.5 kVrms level, the 1.5 kVrms , 60 Hz for 1 minute is unnecessary.

Table 78. Test No. 20: Effect of Temporary Overloads, 5.5.3.7.2, Form 2S, Meter Serial No. 10275, Test Results



Plot 3. Test No. 20: Effect of Temporary Overloads, 5.5.3.7.2, 12kA rms

Photograph 26. Test No. 20: Effect of Temporary Overloads, 5.5.3.7.2, 12kA Peak, Overcurrent

Photograph 27. Test No. 20: Effect of Temporary Overloads, 5.5.3.7.2, Insulation, Setup

Test No. 21: Effect of Current Surges in Ground Conductors

Test Requirement(s): **ANSI C12.1 4.7.3.7** The EUT shall meet the limits shown in Table 79:

CONDITION	CURRENT CLASS			MAXIMUM DEVIATION IN PERCENT FROM REFERENCE PERFORMANCE
	100	200	320	
	CURRENT IN AMPERES			
Reference performance	15	30	50	Reference
Condition (1)	15	30	50	±1.0

Table 79. Effects of Current Surge in Ground Conductor from Section 4.7.3.7 of ANSI C12.1

Test Procedures: Each EUT was supplied by a sine wave source with a distortion factor of ≤3%. Each EUT was subjected to a 20,000 Amp surge through a conductor placed 1.5 inches behind the EUT as required by ANSI C12.20 Section 5.5.3.5.

Test Results: The EUT was compliant with the requirement of this Section.

Test Engineer(s): Aldo Della Coletta

Test Date(s): 03/02/10

Test No. 21: Current Surges in Ground Conductors, Form 2S, SN10293

Test Date:	Tuesday, March 02, 2010		Meter Form Factor:	2S
Test Engineer:	ADC		Meter Class:	CL 200
Metrak # :	27839		Testing Mode:	standard
Customer:	Wasion		Monitoring Method:	Kh inter./standard comp.
Specifications	ANSI C12.1 : 2007		Setup Verification	ADC
EUT Descriptor:	Electric Meter		Photo Filename:	Test #21 setup
Model number:	Libra		Modifications:	none pertinent
Serial number:	xx293		Compliance Date:	3/2/2010

Test Conditions:

Environmental:	**Temperature:**	**Relative Humidity:**	**Barometric Pressure**	**Others (Specifically Required Conditions):** None	
	23°C	36%	1132mBar		
Parametric:	**Impulse current**	**Separation Impulser-EUT**	**Number of Impulses**	**AC supply to Voltage circuits**	**Current thru Elements**
	20 kAmp	1.5"	1	240 Vrms	30 Amp

Test Results:

Reference Performance Standard Comparator error (pre-impulse data)					**ANSI Condition 1 post-impulse Standard Comparator error data**			
run #	**standard error**	**run #**	**standard error**		**run #**	**standard error**	**run #**	**standard error**
1	+0.14	6	+0.05		1	+0.04	6	+0.05
2	+0.06	7	+0.03		2	+0.07	7	+0.06
3	+0.01	8	+0.06		3	+0.05	8	+0.06
4	+0.04	9	+0.07		4	+0.07	9	+0.06
5	+0.03	10	+0.03		5	+0.04	10	+0.05
Mean =	0.052	Sigma =	0.04		Mean =	0.055	Sigma =	0.01

Net deviation		**Deviation limits**		**Notes and Description of Anomalies**
+3 e-5		+/- 1 %		
				No anomalies encountered. Excellent data and performance.
Functionality	ok	Pass/Fail	Pass	

Table 80. Test No. 21: Current Surges in Ground Conductors, Form 2S, SN10293, Test Results

Test No. 21: Current Surges in Ground Conductors, Form 2S, SN10294

Test Date:	Tuesday, March 02, 2010		Meter Form Factor:	2S
Test Engineer:	ADC		Meter Class:	CL 200
Metrak # :	27839		Testing Mode:	standard
Customer:	Wasion		Monitoring Method:	Kh inter./standard comp.
Specifications	ANSI C12.1 : 2007		Setup Verification	ADC
EUT Descriptor:	Electric Meter		Photo Filename:	Test #21 setup
Model number:	Libra		Modifications:	none pertinent
Serial number:	xx294		Compliance Date:	3/2/2010

Test Conditions:

Environmental:	**Temperature:**	**Relative Humidity:**	**Barometric Pressure**	**Others (Specifically Required Conditions):** None	
	23°C	36%	1132mBar		
Parametric:	**Impulse current**	**Separation Impulser-EUT**	**Number of Impulses**	**AC supply to Voltage circuits**	**Current thru Elements**
	20 kAmp	1.5"	1	240 Vrms	30 Amp

Test Results:

Reference Performance Standard Comparator error (pre-impulse data)					**ANSI Condition 1 post-impulse Standard Comparator error data**			
run #	**standard error**	**run #**	**standard error**		**run #**	**standard error**	**run #**	**standard error**
1	+0.08	6	+0.05		1	+0.05	6	+0.05
2	+0.06	7	+0.06		2	+0.06	7	+0.06
3	+0.05	8	+0.06		3	+0.06	8	+0.06
4	+0.06	9	+0.07		4	+0.07	9	+0.06
5	+0.05	10	+0.07		5	+0.04	10	+0.07
Mean =	+0.061	Sigma =	0.01		Mean =	+0.058	Sigma =	0.009

Net deviation		**Deviation limits**		**Notes and Description of Anomalies**
+3 e-5		+/- 1 %		
				No anomalies encountered. Excellent data and performance.
Functionality	ok	Pass/Fail	Pass	

Table 81. Test No. 21: Current Surges in Ground Conductors, Form 2S, SN10294, Test Results

Test No. 21: Current Surges in Ground Conductors, Form 2S, SN10295

Test Date:	Tuesday, March 02, 2010		Meter Form Factor:	2S
Test Engineer:	ADC		Meter Class:	CL 200
Metrak # :	27839		Testing Mode:	standard
Customer:	Wasion		Monitoring Method:	Kh inter./standard comp.
Specifications	ANSI C12.1 : 2007		Setup Verification	ADC
EUT Descriptor:	Electric Meter		Photo Filename:	Test #21 setup
Model number:	Libra		Modifications:	none pertinent
Serial number:	xx295		Compliance Date:	3/2/2010

Test Conditions:

Environmental:	**Temperature:**	**Relative Humidity:**	**Barometric Pressure**	**Others (Specifically Required Conditions):** None	
	23°C	36%	1132mBar		
Parametric:	**Impulse current**	**Separation Impulser-EUT**	**Number of Impulses**	**AC supply to Voltage circuits**	**Current thru Elements**
	20 kAmp	1.5"	1	240 Vrms	30 Amp

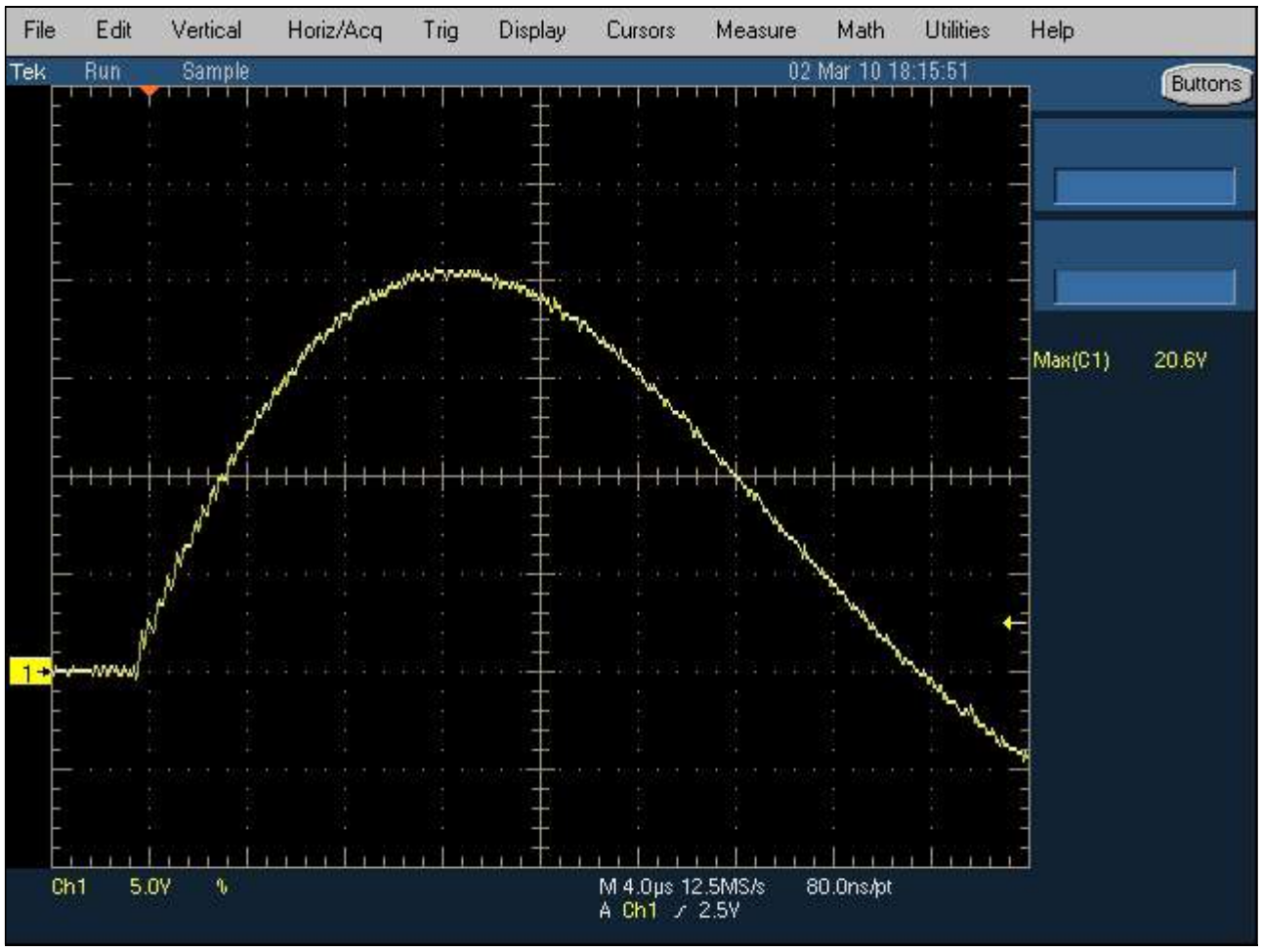
Test Results:

Reference Performance Standard Comparator error (pre-impulse data)					ANSI Condition 1 post-impulse Standard Comparator error data			
run #	**standard error**	**run #**	**standard error**		**run #**	**standard error**	**run #**	**standard error**
1	+0.04	6	+0.05		1	+0.04	6	+0.03
2	+0.02	7	+0.06		2	+0.03	7	+0.06
3	+0.05	8	+0.08		3	+0.04	8	+0.04
4	+0.06	9	+0.07		4	+0.05	9	+0.03
5	+0.04	10	+0.06		5	+0.04	10	+0.04
Mean =	+0.053	Sigma =	0.02		Mean =	+0.04	Sigma =	0.009

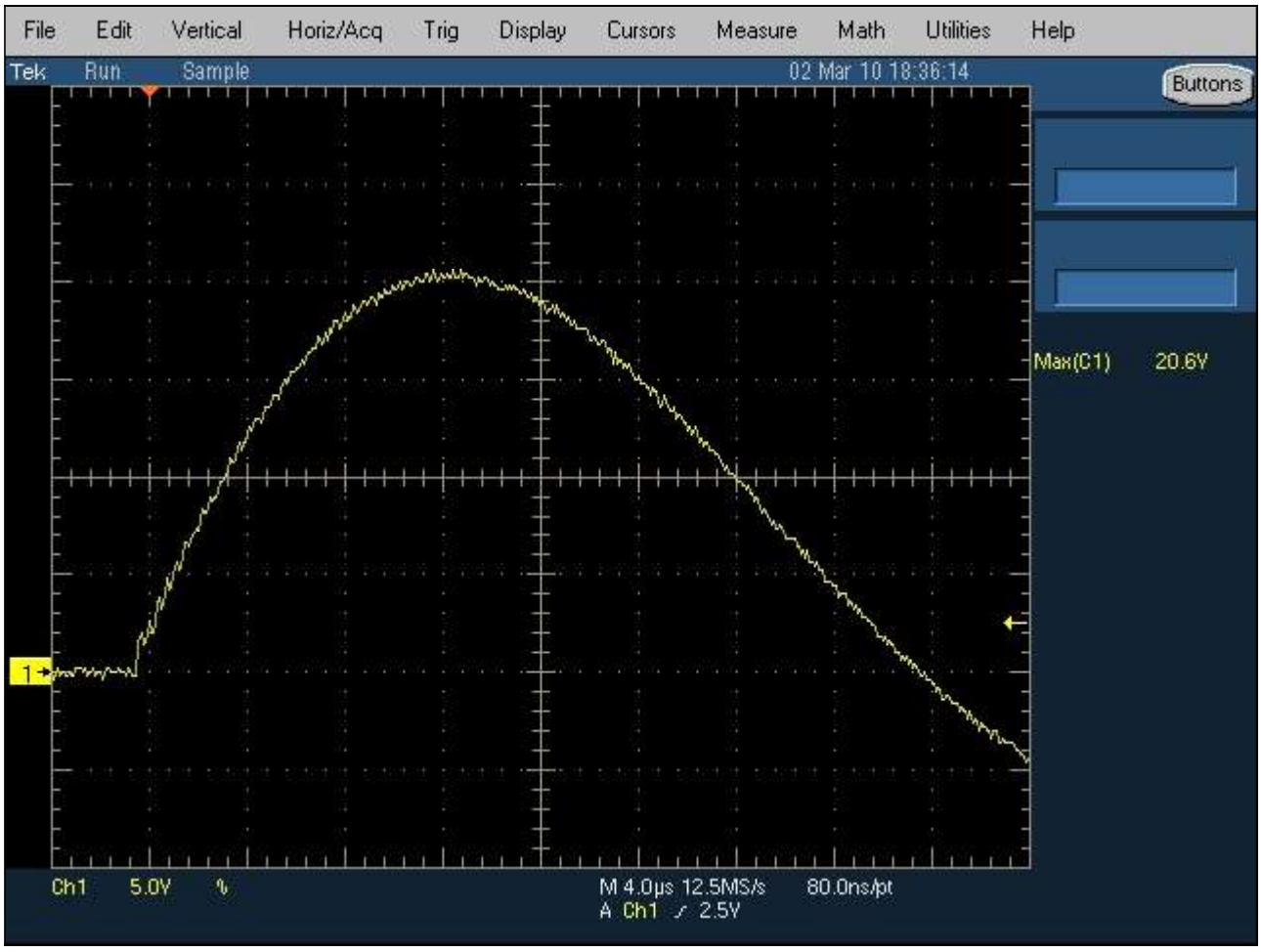
Net deviation		Deviation limits		Notes and Description of Anomalies
-1.3 e-4		+/- 1 %		
				No anomalies encountered. Excellent data and performance.
Functionality	ok	Pass/Fail	Pass	

Table 82. Test No. 21: Current Surges in Ground Conductors, Form 2S, SN10295, Test Results

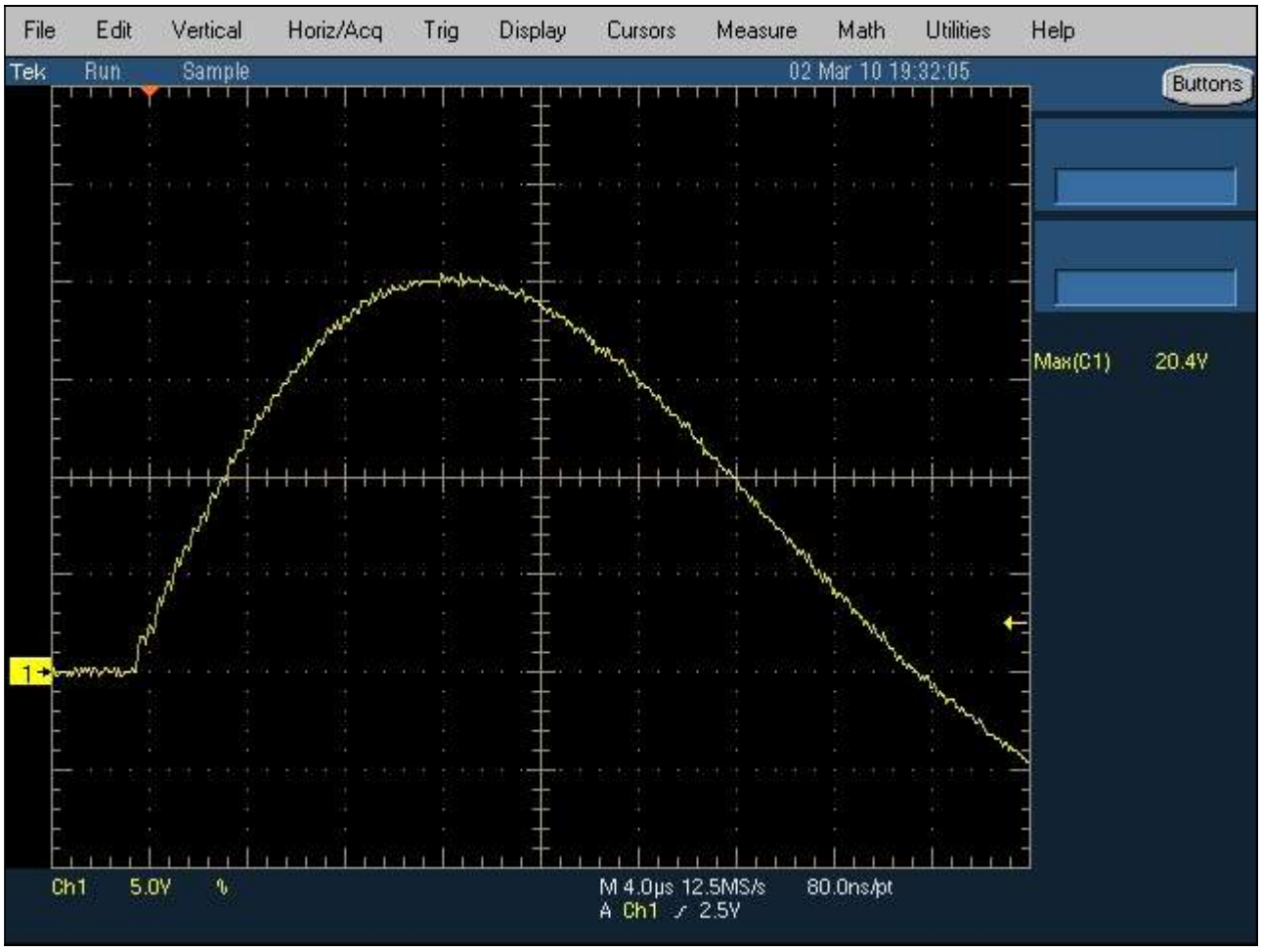
Test No. 21: Current Surges in Ground Conductors, Test Setup



Plot 4. Test No. 21: Current Surges in Ground Conductors, Meter Serial No. 10293



Plot 5. Test No. 21: Current Surges in Ground Conductors, Meter Serial No. 10294



Plot 6. Test No. 21: Current Surges in Ground Conductors, Meter Serial No. 10295

Photograph 28. Test No. 21: Current Surges in Ground Conductors, Test Setup

Test No. 23: Effect of Voltage Variation/Secondary

Test Requirement(s): With the battery disconnected for a minimum of 2 hours and an auxiliary dc power supply connected to the battery carry over circuit, the accuracy of the secondary time base shall be within ±0.02% (2 minutes per week) with a voltage variation of ± 5% of nominal battery voltage.

Test Results: The EUT was not applicable with the requirement of this Section. Samples do not have a secondary time base

Test No. 24: Effect of Ambient Temperature/Secondary Time Base

Test Requirement(s): This test shall be conducted with the metering device in the battery carryover mode. The accuracy of the secondary time shall be within ±0.02% (2 minutes per week) at ambient temperatures of -30°C ± 5°C and 70°C ± 5°C. The metering device shall be exposed to each specified temperature for not less than 2 hours prior to testing.

Test Results: The EUT was not applicable with the requirement of this Section. The meter sample does not have a secondary time base.

Test No. 25: Electrical Fast Transient/Burst

Test Requirement(s): **ANSI C12.1 4.7.3.11** Per *IEC 61000-4-4*, The EUT was tested with the electrical fast transients shown in Figure 2, having amplitude of up to ± 4 kV applied to the AC power cables (plug type); ± 4 kV applied to I/O and data lines. Only cables that could potentially exceed 3 m in length in real-world application of the EUT need be tested. Performance criterion A applies for all tests.

Test Procedures: The EUT was placed on a 0.1 m high wooden support above a GRP extending at least 0.1 m beyond all sides of the EUT (See Photograph 4). The Electrical Fast Transient/Burst (EFT/B) generator and the coupling clamp were mounted to the ground plane. For application of the fast transients to the power lines, power was supplied to the EUT through the EFT/B generator. For application of the fast transients to I/O, data and control lines, the cables were individually placed in the coupling clamp, which was also connected to the EFT/B generator.

The EFT/B generator was operated to couple the required transient bursts to each line of the power input in common mode. Transient bursts were applied for a period not less than one minute with both positive transients and negative transients.

The EUT was then powered from an isolated circuit, and selected I/O, data and control cables were placed one at a time in the capacitive coupling clamp. The EFT/B generator was operated to inject the required bursts onto each selected cable via the coupling clamp. Throughout testing, the EUT was monitored closely for signs of susceptibility.

Test Results: The EUT was compliant with the requirement(s) of this section.

Test Engineer(s): Francis Chau

Test Date(s): 01/11/10 to 02/02/10

Test No. 25: Electrical Fast Transient/Burst Test Results, Form 2S, SN10268

Test date:	Monday, January 11, 2010
Test Engineer:	FC
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1:2008
Setup Verification:	FC On 1/11/2010
Photo Filename:	EFT 27839
Compliance Date:	1/11/2010

EUT Descriptor:	Watthour Meters
Model number:	Libra
Serial number:	20081165010268
Meter Form Factor:	Form 2S
Meter Class:	CL200
Rated Voltage (fixed or range):	240VAC
Mode & Monitoring:	Meter LCD Display
Modifications:	Series Test, none allowable

Test Conditions:

Environmental:		Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions): -			
		19°C	21%	101mBar				
Parametric:	Voltage and Current Circuits	Test Voltage	Repetition Rate:	Burst Duration: :	Burst Period:	Test Duration:	Voltage and Current Circuits:	Current on Current Circuits:
		4kV	5kHz	15 ms	300ms	60s.	120Vrms	0 Amp

Test Results:

Voltage Circuits	Polarity of transient	Pass/Fail (note all anomalies)	Current Circuits	Polarity of transient	Pass/Fail (note all anomalies)
Line 1, L2 and Neutral to Ground	positive	Pass	Element 1	positive	Pass
	negative	Pass		negative	Pass
Line 1 to Ground	positive	Pass	Element 2	positive	Pass
	negative	Pass		negative	Pass
Line 2 to Ground	positive	Pass			
	negative	Pass			
Neutral to Ground	positive	Pass			
	negative	Pass			

Registration at Start	Registration at End
0.0 kWh	0.0 kWh
Net Totalization	**Meter functionality**
0.000	No anomalies

Table 83. Test No. 25: Electrical Fast Transients, Form 2S, SN10268, Test Results

*Note: on certain Form Factors, testing may be redundant for some Current or Voltage lines.

Test No. 25: Electrical Fast Transient/Burst Test Results, Form 2S, SN10270

Test date:	Monday, January 11, 2010
Test Engineer:	FC
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1:2008
Setup Verification:	FC On 1/11/2010
Photo Filename:	EFT 27839
Compliance Date:	1/11/2010

EUT Descriptor:	Watthour Meters
Model number:	Libra
Serial number:	20081165010270
Meter Form Factor:	Form 2S
Meter Class:	CL200
Rated Voltage (fixed or range):	240VAC
Mode & Monitoring:	Meter LCD Display
Modifications:	Series Test, none allowable

Test Conditions:

Environmental:		Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions): -			
		19°C	21%	101mBar				
Parametric:	Voltage and Current Circuits	Test Voltage	Repetition Rate:	Burst Duration: :	Burst Period:	Test Duration:	Voltage and Current Circuits:	Current on Current Circuits:
		4kV	5kHz	15 ms	300ms	60s.	120Vrms	0 Amp

Test Results:

Voltage Circuits	Polarity of transient	Pass/Fail (note all anomalies)	Current Circuits	Polarity of transient	Pass/Fail (note all anomalies)
Line 1, L2 and Neutral to Ground	positive	Pass	Element 1	positive	Pass
	negative	Pass		negative	Pass
Line 1 to Ground	positive	Pass	Element 2	positive	Pass
	negative	Pass		negative	Pass
Line 2 to Ground	positive	Pass			
	negative	Pass			
Neutral to Ground	positive	Pass			
	negative	Pass			

Registration at Start	Registration at End
0.0 kWh	0.0 kWh
Net Totalization	**Meter functionality**
0.000	No anomalies

Table 84. Test No. 25: Electrical Fast Transients, Form 2S, SN10270, Test Results

*Note: on certain Form Factors, testing may be redundant for some Current or Voltage lines.

Test No. 25: Electrical Fast Transient/Burst Test Results, Form 2S, SN10275

Test date:	Monday, January 11, 2010
Test Engineer:	FC
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1:2008
Setup Verification:	FC On 1/11/2010
Photo Filename:	EFT 27839
Compliance Date:	1/11/2010

EUT Descriptor:	Watthour Meters
Model number:	Libra
Serial number:	20081165010275
Meter Form Factor:	Form 2S
Meter Class:	CL200
Rated Voltage (fixed or range):	240VAC
Mode & Monitoring:	Meter LCD Display
Modifications:	Series Test, none allowable

Test Conditions:

Environmental:		Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions): -			
		19°C	21%	101mBar				
Parametric:	Voltage and Current Circuits	Test Voltage	Repetition Rate:	Burst Duration:	Burst Period:	Test Duration:	Voltage and Current Circuits:	Current on Current Circuits:
		4kV	5kHz	15 ms	300ms	60s.	120Vrms	0 Amp

Test Results:

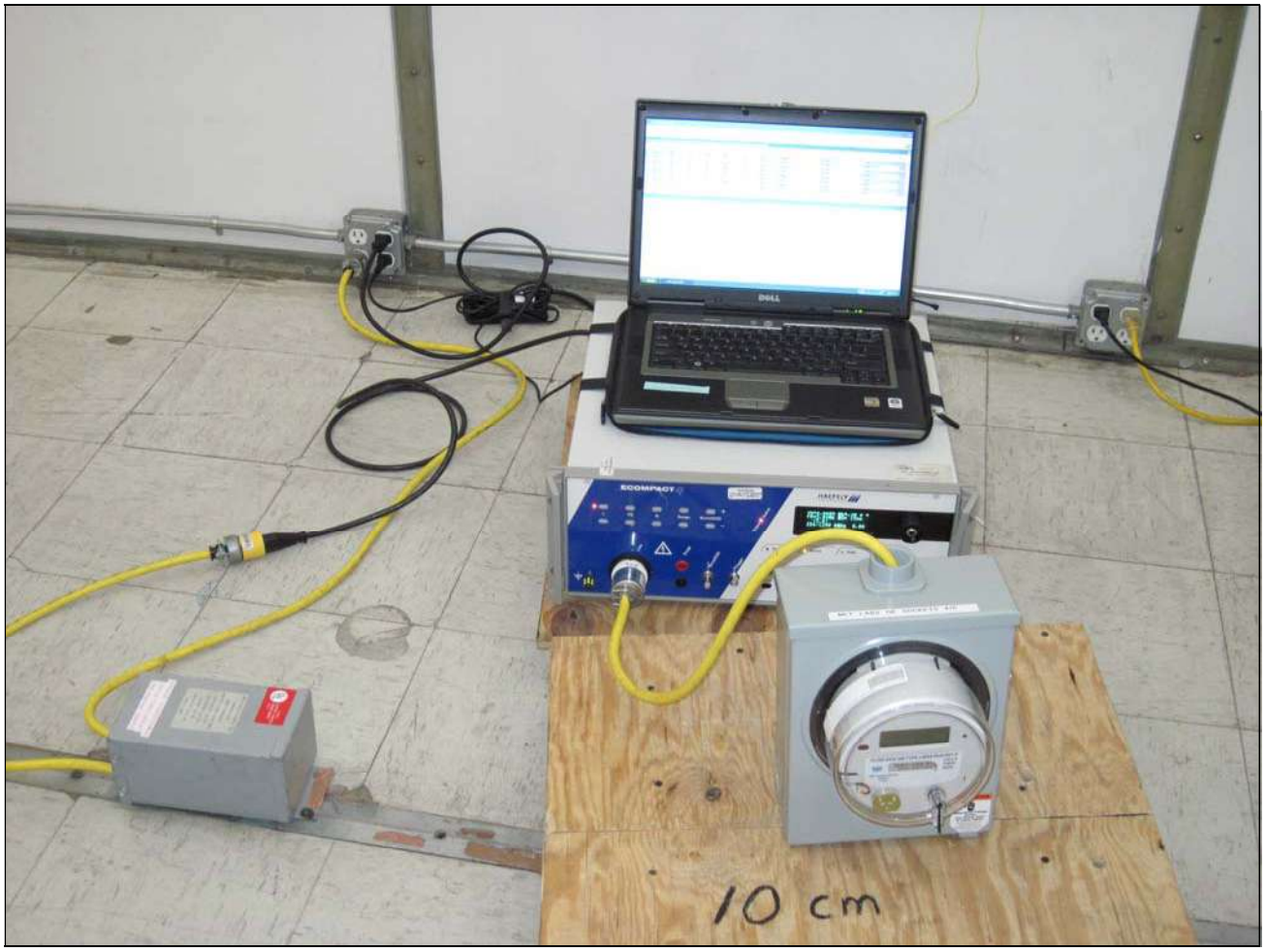
Voltage Circuits	Polarity of transient	Pass/Fail (note all anomalies)	Current Circuits	Polarity of transient	Pass/Fail (note all anomalies)
Line 1, L2 and Neutral to Ground	positive	Pass	Element 1	positive	Pass
	negative	Pass		negative	Pass
Line 1 to Ground	positive	Pass	Element 2	positive	Pass
	negative	Pass		negative	Pass
Line 2 to Ground	positive	Pass			
	negative	Pass			
Neutral to Ground	positive	Pass			
	negative	Pass			

Registration at Start	Registration at End
0.0 kWh	0.0 kWh
Net Totalization	**Meter functionality**
0.000	No anomalies

Table 85. Test No. 25: Electrical Fast Transients, Form 2S, SN10275, Test Results

*Note: on certain Form Factors, testing may be redundant for some Current or Voltage lines.

Test No. 25: Electrical Fast Transient/Burst Test Setup



Photograph 29. Test No. 25: Electrical Fast Transient/Burst Test Setup

Test No. 25a: Oscillatory Surge Withstand Capability

Test Requirement(s): **ANSI C12.1 4.7.3.11a** Per IEEE C37.90.1, The EUT was tested with the e Electrical Oscillatory SWC. This , test subjects the power inputs and the I/O circuits of the metering device to repetitive bursts damped oscillatory waves with an initial crest of 2.5 kV for a duration of 2 minutes.

The application points was Current, Voltage, Power supply, Input circuit, output, Data communications and Signal circuit as defined in ANSI/IEEE C37.90.1-2002, and be per Table 26 below. In addition to the definitions of these terms in ANSI/IEEE C37.90.1-2002, "Data communications" and "Signal circuit" shall be defined for a metering device as follows:

Data communications shall include: TIP and Ring on an output from a Modem, any RS232/485 lines, plus any other communications type output inputs. The application of the waveform would be capacitively coupled to the lines. These lines shall not be considered as "Input circuit" or "Output", requiring a direct application to the ports.

Signal circuit shall include: KYZ outputs, KYZ inputs, customer alert lines, EOI outputs, EOI inputs, plus others. The application of the waveform would be capacitively coupled to the lines. These lines shall not be considered as "Input circuit" or "Output", requiring a direct application to the ports.

Test Procedures:

Test Results: The EUT was compliant with the requirement(s) of this section.

Test Engineer(s): Francis Chau

Test Date(s): 01/14/10 to 02/02/10

Test No. 25a: Oscillatory Surge Withstand Capability, Form 2S, SN10268

Test date:	Tuesday, February 02, 2010
Test Engineer:	FC
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1:2008
Setup Verification:	FC On 2/2/2010
Photo Filename:	SWC 27839
Compliance Date:	2/2/2010

EUT Descriptor:	Watthour Meters
Model number:	Libra
Serial number:	20081165010268
Meter Form Factor:	Form 2S
Meter Class:	CL200
Rated Voltage (fixed or range):	240VAC
Mode & Monitoring:	Meter LCD Display
Modifications:	Series Test, none allowable

Test Conditions:

Environmental:		Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions): -			
		19°C	21%	102.4mBar				
Parametric:	Voltage and Current Circuits	Crest Voltage 1st quadrant	Damping @ 3≥periods≤6	Rise time 1st quadrant	Asynchronous Repetition Rate	Gen. Source Impedance	Duration	Repetitions
		2.5 kVolts	50%	75 ns	400 Hz	200 Ω	120 s	2

Test Results:

Power Lines Common Mode tests	Test Voltage	Outcome		Power lines Transverse Mode tests	Test Voltage	Outcome
Line 1 - PE	+/-2.5 kV	Pass		Line1-Line 2	+/-2.5 kV	Pass
Line 2 - PE	+/-2.5 kV	Pass		Line 1 - Neutral	+/-2.5 kV	Pass
Neutral - PE	+/-2.5 kV	Pass		Line 2 - Neutral	+/-2.5 kV	Pass
Line1 + Line 2 + Neutral - PE	+/-2.5 kV	Pass				

Registration at Start	Registration at End	Net Totalization	Meter Functionality	Pass/ Fail
0.0kWh	0.0kWh	0	No anomalies	Pass

Table 86. Test No. 25a: Oscillatory Surge Withstand Capability, Form 2S, Form 2S, SN10268, Test Results

*Note: on certain Form Factors, testing may be redundant for some Current or Voltage lines.

Test No. 25a: Oscillatory Surge Withstand Capability, Form 2S, SN10270

Test date:	Tuesday, February 02, 2010
Test Engineer:	FC
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1:2008
Setup Verification:	FC On 2/2/2010
Photo Filename:	SWC 27839
Compliance Date:	2/2/2010

EUT Descriptor:	Watthour Meters
Model number:	Libra
Serial number:	20081165010270
Meter Form Factor:	Form 2S
Meter Class:	CL200
Rated Voltage (fixed or range):	240VAC
Mode & Monitoring:	Meter LCD Display
Modifications:	Series Test, none allowable

Test Conditions:

Environmental:		Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions): -			
		19°C	21%	102.4mBar				
Parametric:	Voltage and Current Circuits	Crest Voltage 1st quadrant	Damping @ 3≥periods≤6	Rise time 1st quadrant	Asynchronous Repetition Rate	Gen. Source Impedance	Duration	Repetitions
		2.5 kVolts	50%	75 ns	400 Hz	200 Ω	120 s	2

Test Results:

Power Lines Common Mode tests	Test Voltage	Outcome		Power lines Transverse Mode tests	Test Voltage	Outcome
Line 1 - PE	+/-2.5 kV	Pass		Line1-Line 2	+/-2.5 kV	Pass
Line 2 - PE	+/-2.5 kV	Pass		Line 1 - Neutral	+/-2.5 kV	Pass
Neutral - PE	+/-2.5 kV	Pass		Line 2 - Neutral	+/-2.5 kV	Pass
Line1 + Line 2 + Neutral - PE	+/-2.5 kV	Pass				

Registration at Start	Registration at End	Net Totalization	Meter Functionality	Pass/ Fail
0.0kWh	0.0kWh	0	No anomalies	Pass

Table 87. Test No. 25a: Oscillatory Surge Withstand Capability, Form 2S, Form 2S, SN10270, Test Results

*Note: on certain Form Factors, testing may be redundant for some Current or Voltage lines.

Test No. 25a: Oscillatory Surge Withstand Capability, Form 2S, SN10270

Test date:	Tuesday, February 02, 2010
Test Engineer:	FC
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1:2008
Setup Verification:	FC On 2/2/2010
Photo Filename:	SWC 27839
Compliance Date:	2/2/2010

EUT Descriptor:	Watthour Meters
Model number:	Libra
Serial number:	20081165010275
Meter Form Factor:	Form 2S
Meter Class:	CL200
Rated Voltage (fixed or range):	240VAC
Mode & Monitoring:	Meter LCD Display
Modifications:	Series Test, none allowable

Test Conditions:

Environmental:		Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions): -			
		19°C	21%	102.4mBar				
Parametric:	Voltage and Current Circuits	Crest Voltage 1st quadrant	Damping @ 3≥periods≤6	Rise time 1st quadrant	Asynchronous Repetition Rate	Gen. Source Impedance	Duration	Repetitions
		2.5 kVolts	50%	75 ns	400 Hz	200 Ω	120 s	2

Test Results:

Power Lines Common Mode tests	Test Voltage	Outcome		Power lines Transverse Mode tests	Test Voltage	Outcome
Line 1 - PE	+/-2.5 kV	Pass		Line1-Line 2	+/-2.5 kV	Pass
Line 2 - PE	+/-2.5 kV	Pass		Line 1 - Neutral	+/-2.5 kV	Pass
Neutral - PE	+/-2.5 kV	Pass		Line 2 - Neutral	+/-2.5 kV	Pass
Line1 + Line 2 + Neutral - PE	+/-2.5 kV	Pass				

Registration at Start	Registration at End	Net Totalization	Meter Functionality	Pass/ Fail
0.0kWh	0.0kWh	0	No anomalies	Pass

Table 88. Test No. 25a: Oscillatory Surge Withstand Capability, Form 2S, Form 2S, SN10275, Test Results

*Note: on certain Form Factors, testing may be redundant for some Current or Voltage lines.

Photograph 30. Test No. 25a: Oscillatory Surge Withstand Capability, Test Setup

Test No. 26: Effect of Radio Frequency Interference

Test Requirement(s): **ANSI C12.1 4.7.3.12** The EUT must not be susceptible to a radiated electromagnetic field of 15 V/m in the frequency range 200 kHz to 10 GHz. The voltage circuits of the EUT will be energized and the current circuits open or unloaded (see Photograph 3). The metering device shall not exhibit a change in the least significant digit in its internal registers and will continue to operate normally after the test.

Test Procedures: EUT was supplied by a AC source with a distortion factor of ≤3%. As required by ANSI C12.20. Section 5.3.4.13, a continuous wave RF energy field with a field-strength of 15V/m was applied and the frequency swept from 200 kHz to 10 GHz. For frequencies below 30 MHz, the transmitting antenna is adjusted so that the electromagnetic field is polarized vertically. Above 30 MHz, the test was repeated for both vertically and horizontal polarizations of the antenna. Below 1 GHz the field was 90% amplitude modulated with a 1 kHz sine wave that was not in sync with any of the EUT's digital clock frequencies. The RF fields sweep rate did not exceed .005 octaves per minute.

Field presence was monitored during testing via a field probe placed in close proximity to the EUT. Throughout testing, the EUT was closely monitored for signs of susceptibility. The test was performed with the antennae oriented in both a horizontal and vertical polarization. Testing was performed in a semi-anechoic chamber. At the conclusion of the test, the operation of the meter was verified.

Test Results: The EUT was compliant/ not compliant with the requirement(s) of this section.

Test Engineer(s): Zijun Tong

Test Date(s): 01/06/10 to 01/26/10

Test No. 26: Effect of Radio Frequency Interference, Test Results, Form 2S, SN10293

Test date:	Monday, January 25, 2010
Test Engineer:	ZT
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1:2001
Setup Verification:	ZT On 1/25/2010
Photo Filename:	RS 27839
Compliance Date:	

EUT Descriptor:	Meters
Model number:	TA30
Serial number:	10293
Meter Form Factor:	2S
Meter Class:	CL200
Rated Voltage (fix or range):	240VAC
Test Mode & Monitoring:	LCD Display
Modifications:	None

Test Conditions:

Environmental:	**Temperature:**	**Relative Humidity:**	**Barometric Pressure**	**Others (Specifically Required Conditions):**	
	25°C	32%	1019mBar	-	
Parametric:	**Frequency Ranges**	**Field Pressure in Volt/meter**	**Modulation dept @ 1.0 kHz**	**Increment step size**	**Dwell Time in seconds ***
	200kHz-30 MHz	15V/m	90%	1%	2.88
	30 MHz-1.0GHz	15V/m	90%	1%	2.88
	1.0 GHz - 10 GHz	15V/m	C.W.	1%	2.88

Note: dwell time adjusted for a scan rate of no less than 200 seconds per octave.

Frequency Ranges	Polarization	Y axis Pass/Fail*	X axis Pass/Fail*
200 kHz - 30 MHz	Unipolar	Pass	Pass
30 MHz - 1.0 GHz	Vertical	Pass	Pass
	Horizontal	Pass	Pass
1.0 GHz - 10 GHz	Vertical	Pass	Pass
	Horizontal	Pass	Pass

Registration at Start	Registration at End
0.0 kWh	0.0 kWh
Net Totalization	Meter functionality
0.000	Pass

Table 89. Test No. 26: Radio Frequency Interference, Form 2S, SN10293, Test Results

Test No. 26: Effect of Radio Frequency Interference, Test Results, Form 2S, SN10294

Test date:	Monday, January 25, 2010
Test Engineer:	ZT
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1:2001
Setup Verification:	ZT On 1/25/2010
Photo Filename:	RS 27839
Compliance Date:	

EUT Descriptor:	Meters
Model number:	TA30
Serial number:	10294
Meter Form Factor:	2S
Meter Class:	CL200
Rated Voltage (fix or range):	240VAC
Test Mode & Monitoring:	LCD Display
Modifications:	None

Test Conditions:

Environmental:	**Temperature:**	**Relative Humidity:**	**Barometric Pressure**	**Others (Specifically Required Conditions):**	
	25°C	32%	1019mBar	-	
Parametric:	**Frequency Ranges**	**Field Pressure in Volt/meter**	**Modulation dept @ 1.0 kHz**	**Increment step size**	**Dwell Time in seconds ***
	200kHz-30 MHz	15V/m	90%	1%	2.88
	30 MHz-1.0GHz	15V/m	90%	1%	2.88
	1.0 GHz - 10 GHz	15V/m	C.W.	1%	2.88

Note: dwell time adjusted for a scan rate of no less than 200 seconds per octave.

Frequency Ranges	Polarization	Y axis Pass/Fail*	X axis Pass/Fail*
200 kHz - 30 MHz	Unipolar	Pass	Pass
30 MHz - 1.0 GHz	Vertical	Pass	Pass
	Horizontal	Pass	Pass
1.0 GHz - 10 GHz	Vertical	Pass	Pass
	Horizontal	Pass	Pass

Registration at Start	Registration at End
0.0 kWh	0.0 kWh
Net Totalization	Meter functionality
0.000	Pass

Table 90. Test No. 26: Radio Frequency Interference, Form 2S, SN10294, Test Results

Test No. 26: Effect of Radio Frequency Interference, Test Results, Form 2S, SN10295

Test date:	Monday, January 25, 2010
Test Engineer:	ZT
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1:2001
Setup Verification:	ZT On 1/25/2010
Photo Filename:	RS 27839
Compliance Date:	

EUT Descriptor:	Meters
Model number:	TA30
Serial number:	10295
Meter Form Factor:	2S
Meter Class:	CL200
Rated Voltage (fix or range):	240VAC
Test Mode & Monitoring:	LCD Display
Modifications:	None

Test Conditions:

Environmental:	**Temperature:**	**Relative Humidity:**	**Barometric Pressure**	**Others (Specifically Required Conditions):**	
	25°C	32%	1019mBar	-	
Parametric:	**Frequency Ranges**	**Field Pressure in Volt/meter**	**Modulation dept @ 1.0 kHz**	**Increment step size**	**Dwell Time in seconds ***
	200kHz-30 MHz	15V/m	90%	1%	2.88
	30 MHz-1.0GHz	15V/m	90%	1%	2.88
	1.0 GHz - 10 GHz	15V/m	C.W.	1%	2.88

Note: dwell time adjusted for a scan rate of no less than 200 seconds per octave.

Frequency Ranges	Polarization	Y axis Pass/Fail*	X axis Pass/Fail*
200 kHz - 30 MHz	Unipolar	Pass	Pass
30 MHz - 1.0 GHz	Vertical	Pass	Pass
	Horizontal	Pass	Pass
1.0 GHz - 10 GHz	Vertical	Pass	Pass
	Horizontal	Pass	Pass

Registration at Start	Registration at End
0.0 kWh	0.0 kWh
Net Totalization	Meter functionality
0.000	Pass

Table 91. Test No. 26: Radio Frequency Interference, Form 2S, SN10295, Test Results

Test No. 26: Effect of Radio Frequency Interference Test Setup

Photograph 31. Test No. 26: Effect of Radio Frequency Interference Test Setup

Test No. 27: Radio Frequency Conducted Emissions Test

Test Requirement(s): **ANSI C12.1 4.7.3.13** Metering devices shall conform to all applicable requirements of the Code of Federal Regulations (CFR) Title 47 Part 15 Subparts A and B for unintentional radiators as Class B Digital Devices, issued by the Federal Communications Commission (Refer to ANSI C63.4[1]):

Conducted Emission Requirements:

15.107 (a) "Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in Table 5. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals."

15.107 (b) "For a Class A digital device that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in Table 5 Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals. The lower limit applies at the band edges."

The EUT shall meet the limits shown in nd B Equipment calculated from FC:

Frequency range (MHz)	15.107(b), Class A Limits (dBµV)		15.107(a), Class B Limits (dBµV)	
	Quasi-Peak	Average	Quasi-Peak	Average
* 0.15- 0.45	79	66	66 - 56	56 - 46
0.45 - 0.5	79	66	56	46
0.5 - 30	73	60	60	50

Note 1 — The lower limit shall apply at the transition frequencies.

Note 2 — The limit decreases linearly with the logarithm if the frequency in the range 0.15 MHz to 0.5 MHz.

* — The FCC issued a Recommended Opinion and Order (RO&O) 989-80 in May 2002, providing transition into the emission limits and frequency ranges shown above.

Table 92. Limits for Class A and B Equipment calculated from FCC Part 15 Subsection 15.107(a)(b)

[1] From *ANSI C63.4 Section 8* "Radiated emissions measurements shall be made over the frequency range specified by the procuring authority or regulatory agency or in a specific referenced document, but not outside of the frequency range of 9 kHz to 40 GHz."

Test Procedures:

For Conducted Emissions testing, the EUT was placed on a 0.8 meter high wooden table inside a shielded enclosure (See Photograph 1). The EUT was situated such that the back of the EUT was 0.4 m from one wall of the shielded enclosure, and the remaining sides of the EUT were no closer than 0.8 m from any other conductive surface. The EUT was powered from a 50 Ω/50 μH Line Impedance Stabilization Network (LISN). The EMC receiver scanned the frequency range from 450 kHz to 30 MHz. Conducted Emissions measurements were made in accordance with *ANSI C63.4-2001 "Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"*. The measurements were performed over the frequency range of 150 kHz to 30 MHz using a 50 Ω/50 μH LISN as the input transducer to an EMC field intensity meter.

For Radiated Emissions testing, the EUT was installed on a 0.8 meter high wooden table (See Photograph 2). Various antennas were placed near the EUT and measurements were taken of the field strengths and frequencies. For final radiated measurements, the EUT was placed in a shielded enclosure and located 3 m from an adjustable antenna mast. For pre-scanning, the spectrum analyzer scanned the frequency range from 30 MHz to 1 GHz to obtain an emission profile of the EUT. For each point of measurement, the turntable was rotated, and the antenna height was varied between 1 m and 4 m, in order to find the maximum radiated emissions. Measurements above 30 MHz were taken using this technique with the antenna in two polarizations: horizontal and vertical. Unless otherwise specified, measurements were made using a quasi-peak detector with a 120 kHz bandwidth for below 1 GHz. For above 1 GHz, measurements were made using an average detector with a 1 MHz Resolution bandwidth and 10 Hz Video bandwidth.

Test Results: The EUT was compliant with the requirement(s) of this section.

Test Engineer(s): Francis Chau

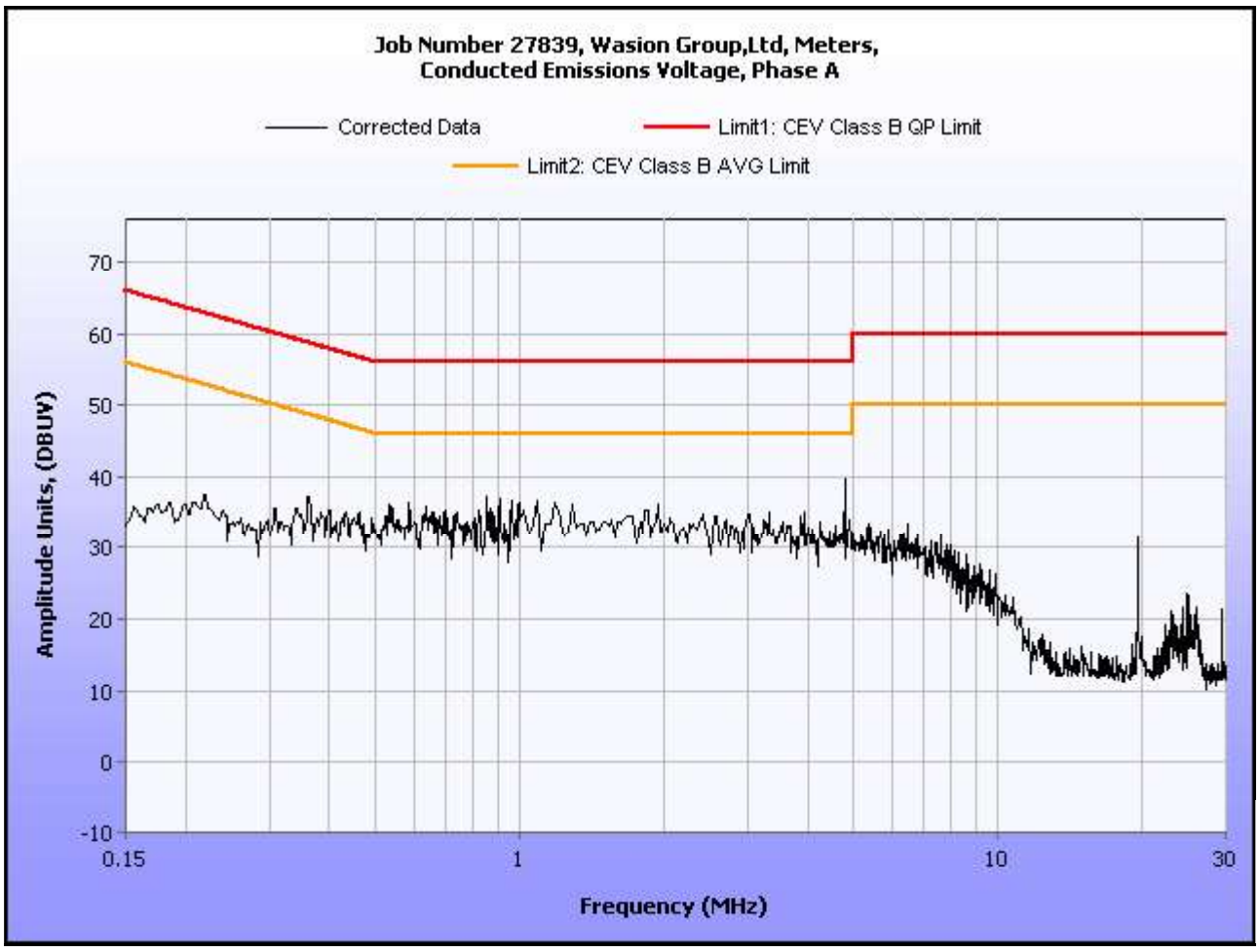
Test Date(s): 01/18/10

Test No. 27: Radio Frequency Conducted Emissions - Voltage, Worst Case Emissions, AC Power, Form 2S, SN10268, Phase A Line

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.17	24.9	0.119	25.019	64.96	-39.941	9.2	0.119	9.319	54.96	-45.641
0.82	24.6	0.17	24.77	56	-31.23	7.8	0.17	7.97	46	-38.03
2.6	24	0.17	24.17	56	-31.83	7	0.17	7.17	46	-38.83
4.8	29.3	0.17	29.47	56	-26.53	7.7	0.17	7.87	46	-38.13
19.66	26.8	0.33	27.13	60	-32.87	18.3	0.33	18.63	50	-31.37
29.47	16.5	0.17848	16.67848	60	-43.3215	8	0.17848	8.17848	50	-41.8215

Table 93. Test No. 27: Radio Frequency Conducted Emissions, Form 2S, SN10268, Phase A Line, Test Results

Meter Functionally Verified



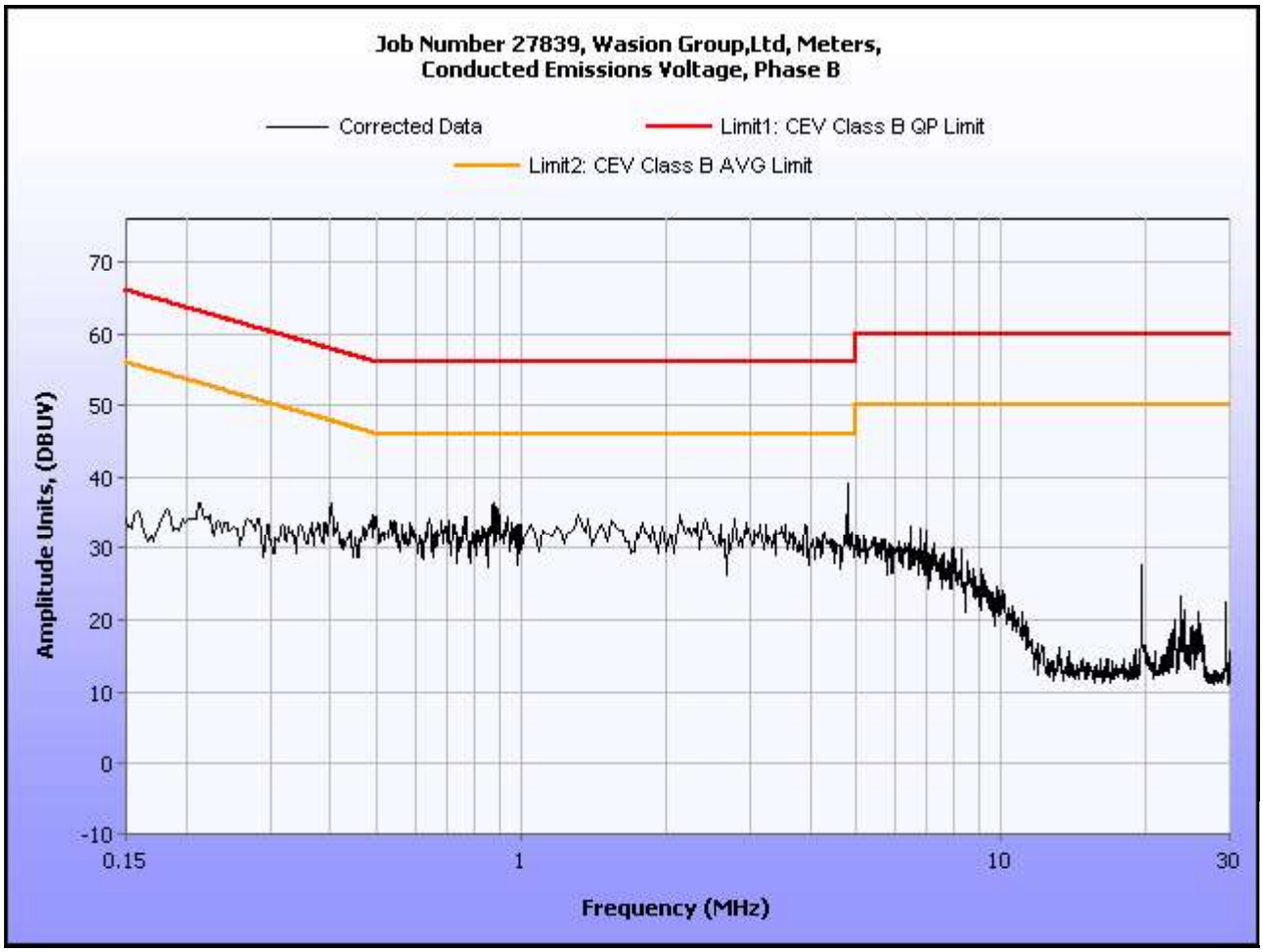
Plot 7. Test No. 27: Radio Frequency Conducted Emissions, Form 2S, SN10268, Phase A Line

Test No. 27: Radio Frequency Conducted Emissions - Voltage, Worst Case Emissions, AC Power, Form 2S, SN10268, Phase B Line

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.88	23	0.17	23.17	56	-32.83	5	0.17	5.17	46	-40.83
4	19.5	0.17	19.67	56	-36.33	7	0.17	7.17	46	-38.83
4.8	36.4	0.17	36.57	56	-19.43	11.4	0.17	11.57	46	-34.43
6.5	17	0.17	17.17	60	-42.83	3.8	0.17	3.97	50	-46.03
19.67	24.5	0.33	24.83	60	-35.17	14.4	0.33	14.73	50	-35.27
29.5	17.4	0.178	17.578	60	-42.422	9.8	0.178	9.978	50	-40.022

Table 94. Test No. 27: Radio Frequency Conducted Emissions, Form 2S, SN10268, Phase B Line, Test Results

Meter Functionally Verified



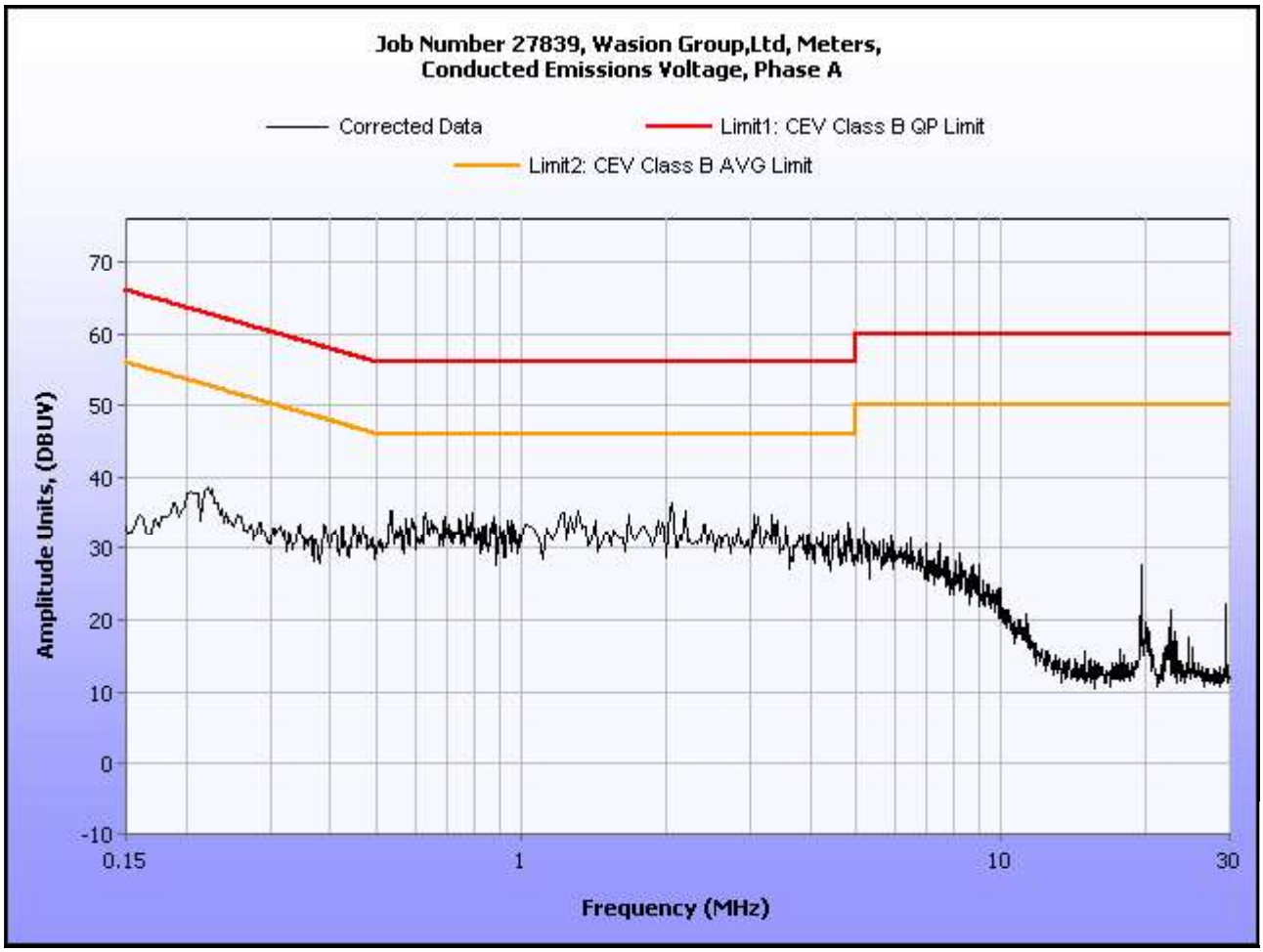
Plot 8. Test No. 27: Radio Frequency Conducted Emissions, Form 2S, SN10268, Phase B Line

Test No. 27: Radio Frequency Conducted Emissions - Voltage, Worst Case Emissions, AC Power, Form 2S, SN10270, Phase Line A

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.15	25	0.085	25.085	66	-40.915	9.2	0.085	9.285	56	-46.715
0.22	30.3	0.17	30.47	62.82	-32.35	10.5	0.17	10.67	52.82	-42.15
1.6	24.3	0.17	24.47	56	-31.53	7.3	0.17	7.47	46	-38.53
4.8	29.8	0.17	29.97	56	-26.03	7.9	0.17	8.07	46	-37.93
19.7	24.2	0.33	24.53	60	-35.47	14.6	0.33	14.93	50	-35.07
29.5	18.7	0.178	18.878	60	-41.122	18.4	0.178	18.578	50	-31.422

Table 95. Test No. 27: Radio Frequency Conducted Emissions, Form 2S, SN10270, Phase Line A, Test Results

Meter Functionally Verified



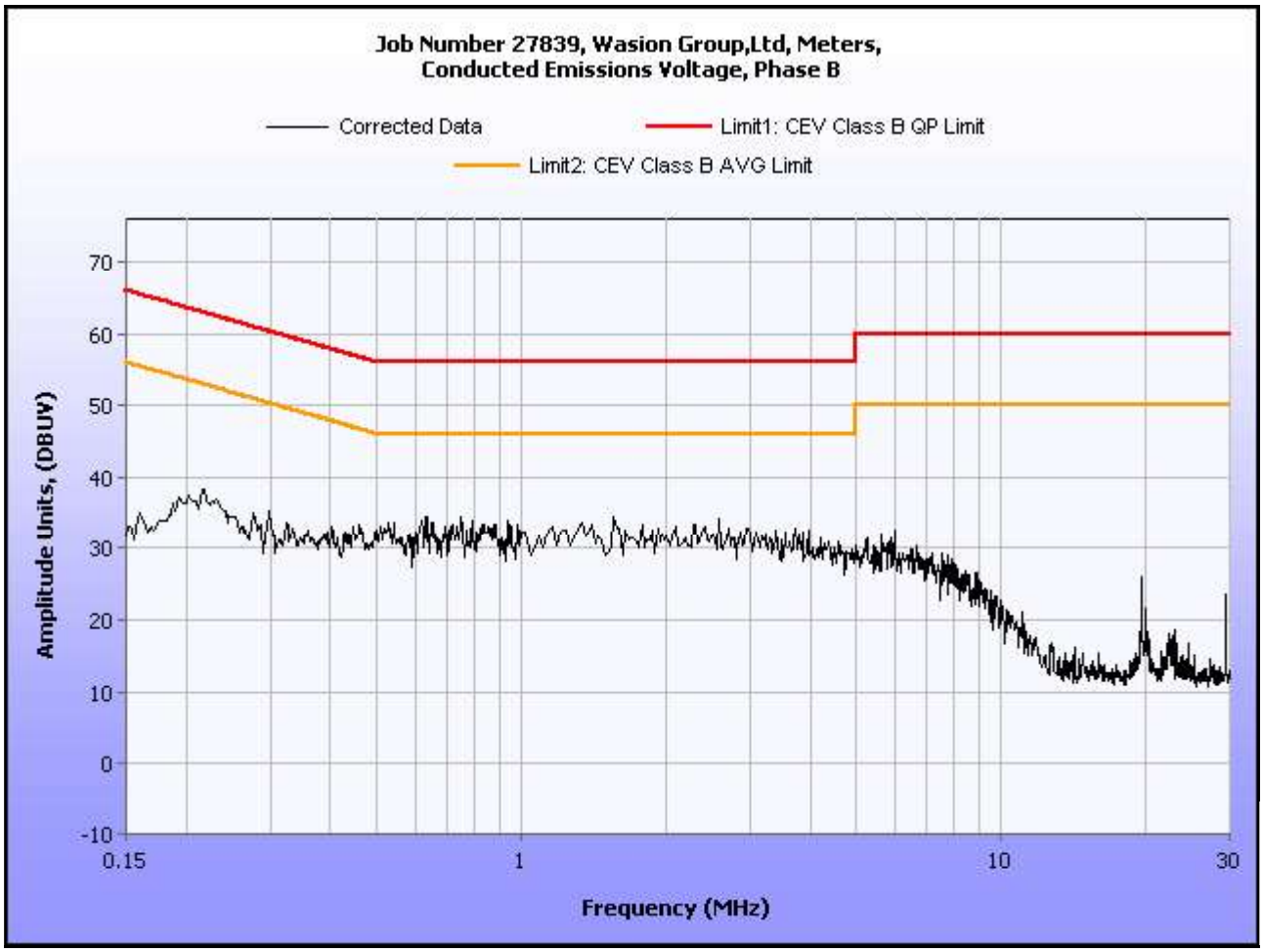
Plot 9. Test No. 27: Radio Frequency Conducted Emissions, Form 2S, SN10270, Phase Line A

Test No. 27: Radio Frequency Conducted Emissions - Voltage, Worst Case Emissions, AC Power, Form 2S, SN10270, Phase Line B

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.2	29.3	0.17	29.47	63.61	-34.14	10.1	0.17	10.27	53.61	-43.34
0.22	30.4	0.17	30.57	62.82	-32.25	10.5	0.17	10.67	52.82	-42.15
1	24.5	0.17	24.67	56	-31.33	7.6	0.17	7.77	46	-38.23
4.8	26.8	0.17	26.97	56	-29.03	7.1	0.17	7.27	46	-38.73
19.6	19.9	0.33	20.23	60	-39.77	10.4	0.33	10.73	50	-39.27
29.5	20.7	0.178	20.878	60	-39.122	12.9	0.178	13.078	50	-36.922

Table 96. Test No. 27: Radio Frequency Conducted Emissions, Form 2S, SN10270, Phase Line B, Test Results

Meter Functionally Verified



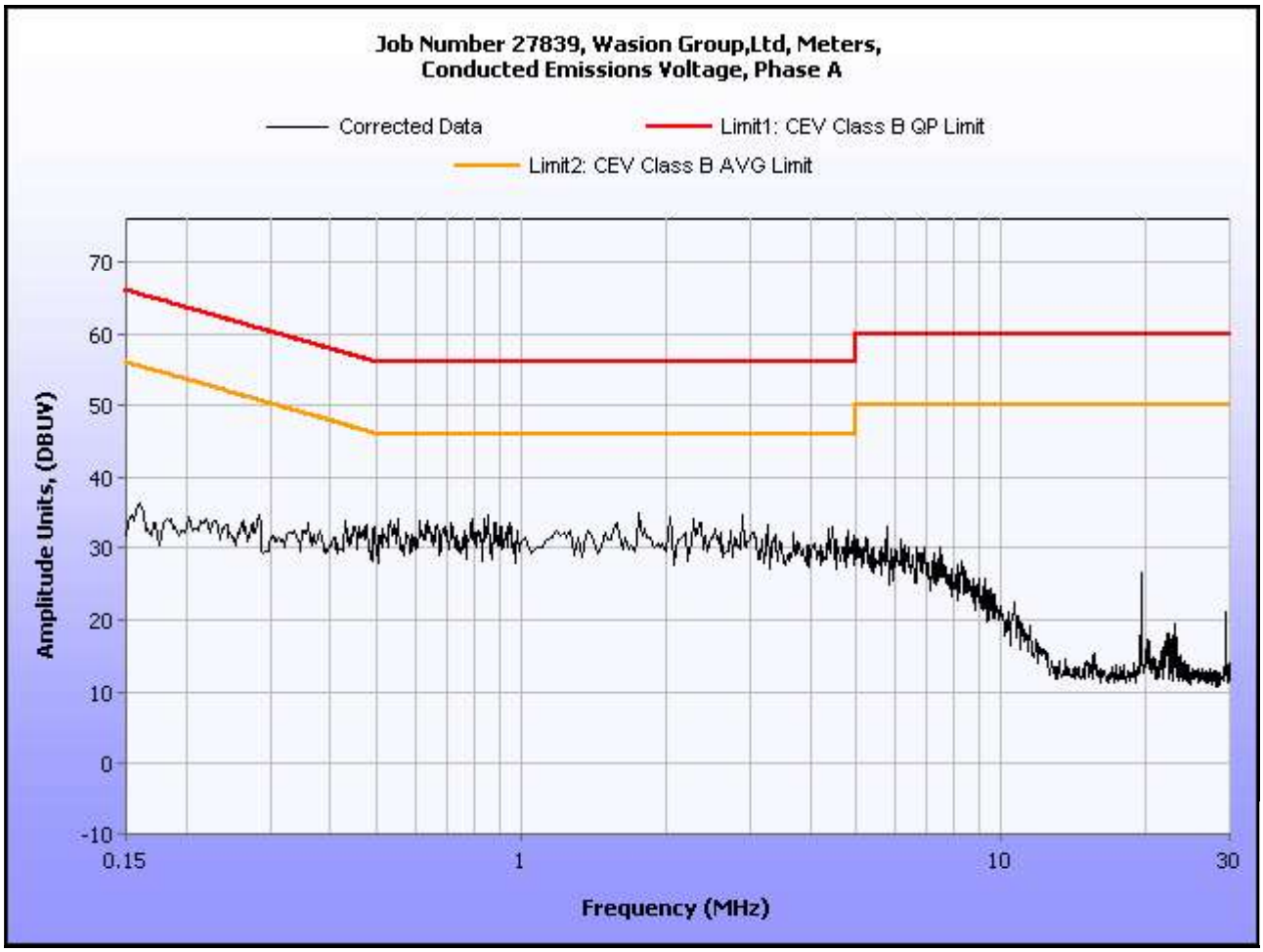
Plot 10. Test No. 27: Radio Frequency Conducted Emissions, Form 2S, SN10270, Phase Line B

Test No. 27: Radio Frequency Conducted Emissions - Voltage, Worst Case Emissions, AC Power, Form 2S, SN10275, Phase Line A

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.21	25.4	0.17	25.57	63.21	-37.64	9	0.17	9.17	53.21	-44.04
0.68	24.6	0.17	24.77	56	-31.23	7.54	0.17	7.71	46	-38.29
1.5	24.9	0.17	25.07	56	-30.93	7.5	0.17	7.67	46	-38.33
4.8	29	0.17	29.17	56	-26.83	8.1	0.17	8.27	46	-37.73
19.6	20.1	0.33	20.43	60	-39.57	10.8	0.33	11.13	50	-38.87
29.5	17	0.178	17.178	60	-42.822	8.2	0.178	8.378	50	-41.622

Table 97. Test No. 27: Radio Frequency Conducted Emissions, Form 2S, SN10275, Phase Line A, Test Results

Meter Functionally Verified



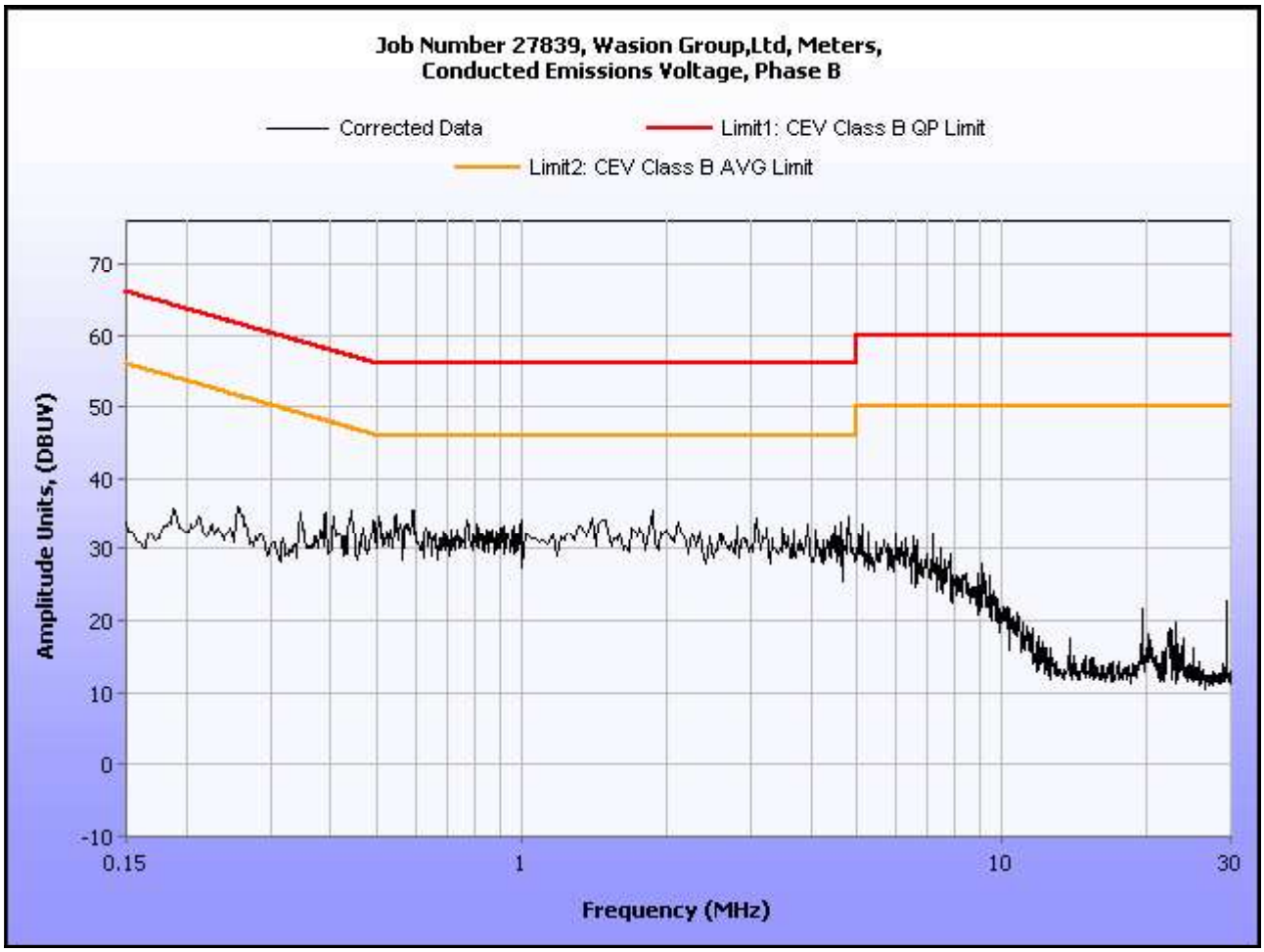
Plot 11. Test No. 27: Radio Frequency Conducted Emissions, Form 2S, SN10275, Phase Line A

Test No. 27: Radio Frequency Conducted Emissions - Voltage, Worst Case Emissions, AC Power, Form 2S, SN10275, Phase Line B

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.18	24.22	0.136	24.356	64.49	-40.134	8.5	0.136	8.636	54.49	-45.854
0.58	24	0.17	24.17	56	-31.83	7.7	0.17	7.87	46	-38.13
1.8	23.6	0.17	23.77	56	-32.23	7.1	0.17	7.27	46	-38.73
4.8	26.8	0.17	26.97	56	-29.03	7	0.17	7.17	46	-38.83
19.6	18.4	0.33	18.73	60	-41.27	10.5	0.33	10.83	50	-39.17
29.5	20.2	0.178	20.378	60	-39.622	11.6	0.178	11.778	50	-38.222

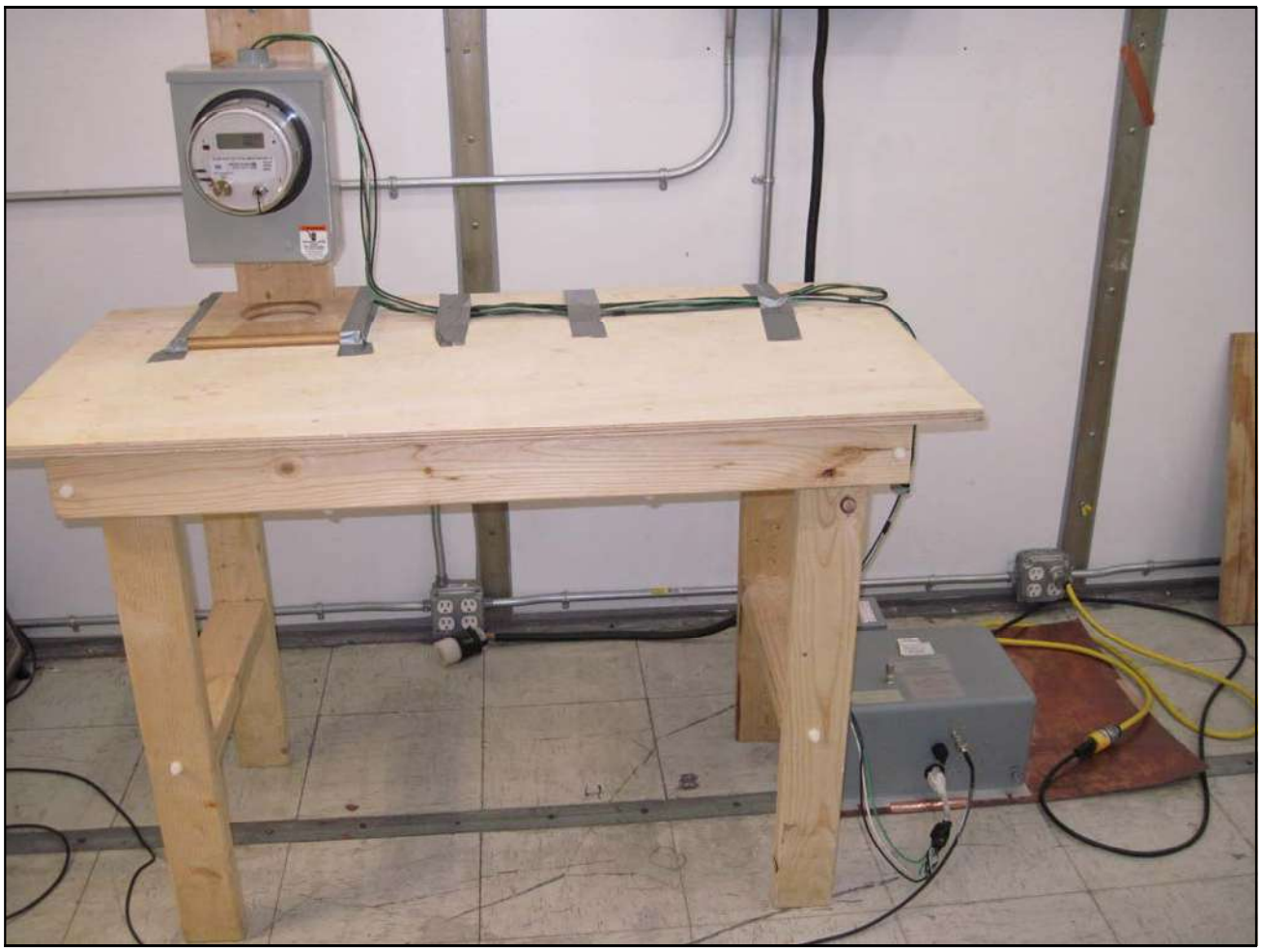
Table 98. Test No. 27: Radio Frequency Conducted Emissions, Form 2S, SN10275, Phase Line B, Test Results

Meter Functionally Verified



Plot 12. Test No. 27: Radio Frequency Conducted Emissions, Form 2S, SN10275, Phase Line B

Test No. 27: Radio Frequency Conducted Emission Limits Test Setup



Photograph 32. Test No. 27: Radio Frequency Conducted Emission Limits Test Setup

Test No. 27: Radio Frequency Radiated Emissions Test

Test Requirement(s): **ANSI C12.1 4.7.3.13** Metering devices shall conform to all applicable requirements of the Code of Federal Regulations (CFR) Title 47 Part 15 Subparts A and B for unintentional radiators as Class B Digital Devices, issued by the Federal Communications Commission (Refer to ANSI C63.4[2]):

Radiated Emission Requirements:

15.109(a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the Class B limits expressed in XREF.

15.109 (b) The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the Class A limits expressed in XREF.

Frequency (MHz)	Field Strength (dBµV/m)	
	§ 15.109 (b), Class A Limit (dBµV) @ 10m	§ 15.109 (a),Class B Limit (dBµV) @ 3m
30 – 88	39.00	40.00
88 – 216	43.50	43.50
216 – 960	46.40	46.00
Above 960	49.50	54.00

Table 99. Radiated Emissions Limits calculated from FCC Part 15, § 15.109 (a) (b)

Test Procedures: For Radiated Emissions testing, the EUT was installed on a 0.8 meter high wooden table (See Photograph 2). Various antennas were placed near the EUT and measurements were taken of the field strengths and frequencies. For final radiated measurements, the EUT was placed in a shielded enclosure and located 3 m from an adjustable antenna mast. For pre-scanning, the spectrum analyzer scanned the frequency range from 30 MHz to 1 GHz to obtain an emission profile of the EUT. For each point of measurement, the turntable was rotated, and the antenna height was varied between 1 m and 4 m, in order to find the maximum radiated emissions. Measurements above 30 MHz were taken using this technique with the antenna in two polarizations: horizontal and vertical. Unless otherwise specified, measurements were made using a quasi-peak detector with a 120 kHz bandwidth for below 1 GHz. For above 1 GHz, measurements were made using an average detector with a 1 MHz Resolution bandwidth and 10 Hz Video bandwidth.

Test Results: The EUT was compliant with the requirement(s) of this section.

Test Engineer(s): Zijun Tong and Michael Cherewka

Test Date(s): 10/13/09 to 01/18/10

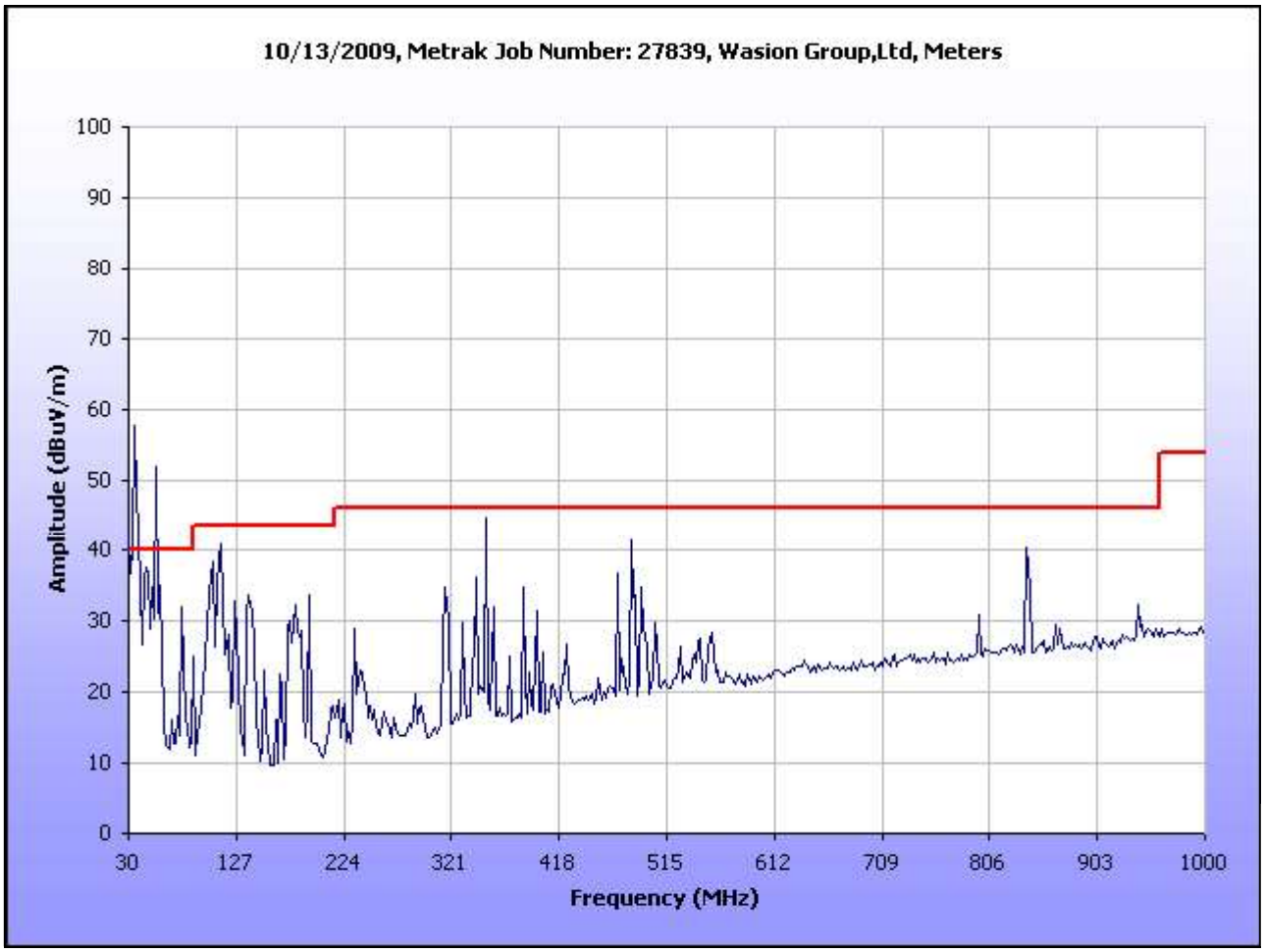
[2] From *ANSI C63.4 Section 8* "Radiated emissions measurements shall be made over the frequency range specified by the procuring authority or regulatory agency or in a specific referenced document, but not outside of the frequency range of 9 kHz to 40 GHz."

Test No. 27: Radio Frequency Radiated Emissions Limits, Test Results, Form 2S SN10282

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected Amplitude (dBuV)	Antenna Correction Factor (dB) (+)	Cable Loss (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
34.570	0	H	1.50	5.42	6.98	1.05	0.00	13.45	40.00	-26.55
34.570	123	V	1.14	13.00	6.44	1.05	0.00	20.49	40.00	-19.51
54.920	4	H	1.34	5.80	9.69	1.09	0.00	16.59	40.00	-23.41
54.920	21	V	1.74	5.80	10.18	1.09	0.00	17.08	40.00	-22.92
103.169	360	H	1.81	18.00	7.58	1.36	0.00	26.94	43.50	-16.56
103.169	293	V	1.33	14.72	7.49	1.36	0.00	23.57	43.50	-19.93
345.687	360	H	1.53	4.86	14.44	2.64	0.00	21.94	46.00	-24.06
345.687	150	V	1.10	11.00	14.65	2.64	0.00	28.30	46.00	-17.70
482.068	200	H	1.39	8.54	17.02	3.35	0.00	28.91	46.00	-17.09
482.068	240	V	1.41	10.00	17.18	3.35	0.00	30.52	46.00	-15.48
840.180	360	H	1.69	6.02	22.20	4.59	0.00	32.81	46.00	-13.19
840.180	0	V	1.25	6.37	21.60	4.59	0.00	32.56	46.00	-13.44

Table 100. Test No. 27: Radio Frequency Radiated Emissions, Form 2S SN10282, Test Results

Meter Functionally Verified



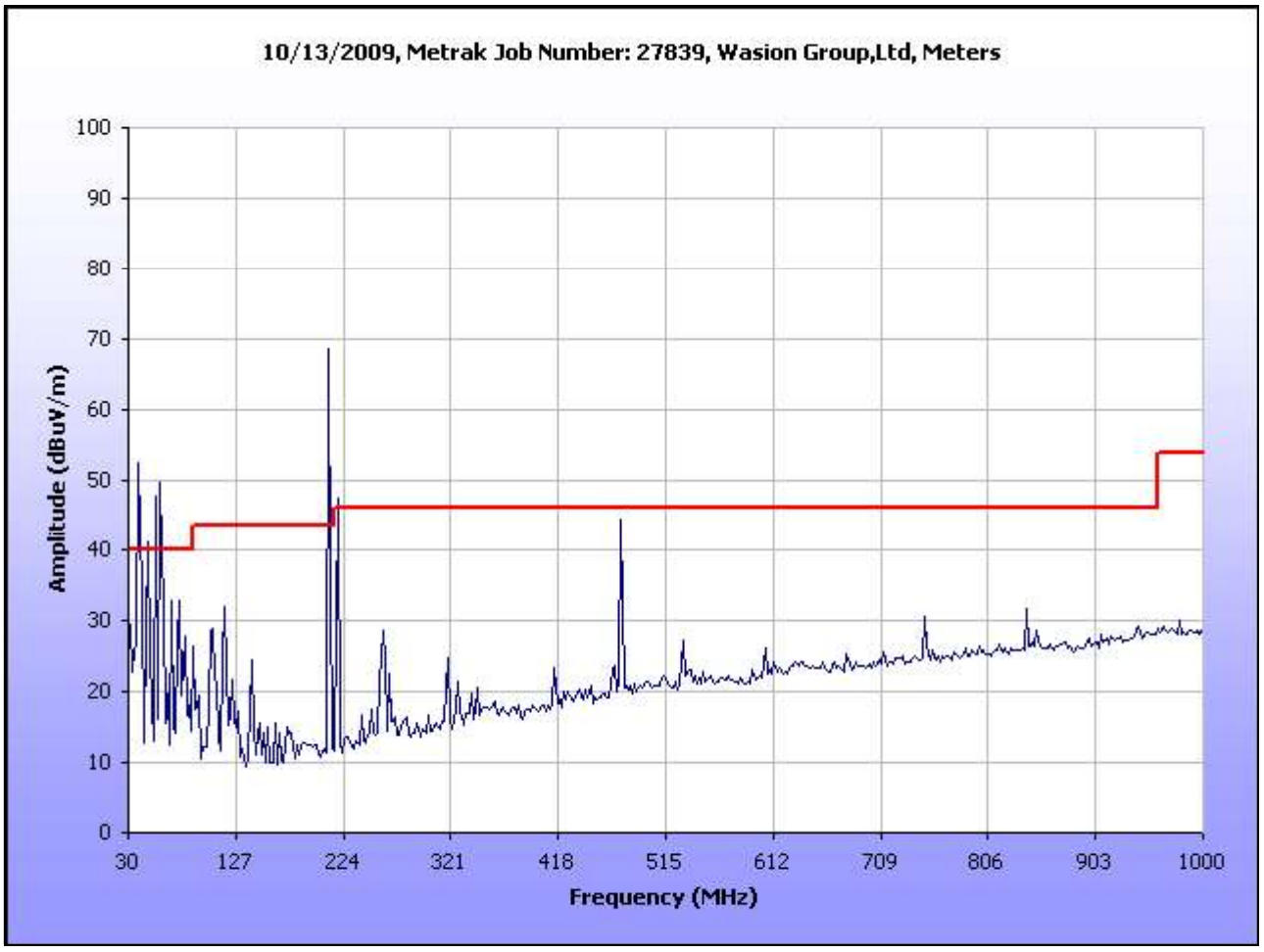
Plot 13. Test No. 27: Radio Frequency Radiated Emissions, Form 2S SN10282, Pre-Scan

Test No. 27: Radio Frequency Radiated Emissions Limits, Test Results, Form 2S SN10283

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected Amplitude (dBuV)	Antenna Correction Factor (dB) (+)	Cable Loss (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
34.631	53	H	1.24	9.10	7.02	1.05	0.00	17.16	40.00	-22.84
34.631	118	V	1.33	22.00	6.48	1.05	0.00	29.52	40.00	-10.48
40.860	161	H	1.66	5.42	8.77	1.04	0.00	15.23	40.00	-24.77
40.860	360	V	1.04	5.57	8.02	1.04	0.00	14.63	40.00	-25.37
47.596	360	H	1.31	5.57	9.20	1.06	0.00	15.84	40.00	-24.16
47.596	82	V	1.53	19.00	8.91	1.06	0.00	28.97	40.00	-11.03
54.940	151	H	1.66	5.80	9.70	1.09	0.00	16.59	40.00	-23.41
54.940	113	V	1.03	5.72	10.19	1.09	0.00	17.00	40.00	-23.00
212.144	170	H	1.93	16.80	10.54	1.75	0.00	29.09	43.50	-14.41
212.144	0	V	1.09	5.26	10.44	1.75	0.00	17.45	43.50	-26.05
218.140	360	H	1.66	4.78	10.54	1.76	0.00	17.08	46.00	-28.92
218.140	0	V	1.04	4.78	10.56	1.76	0.00	17.11	46.00	-28.89
474.966	347	H	1.49	9.00	16.90	3.38	0.00	29.28	46.00	-16.72
474.966	0	V	1.17	9.80	17.40	3.38	0.00	30.58	46.00	-15.42

Table 101. Test No. 27: Radio Frequency Radiated Emissions, Form 2S SN10283, Test Results

Meter Functionally Verified



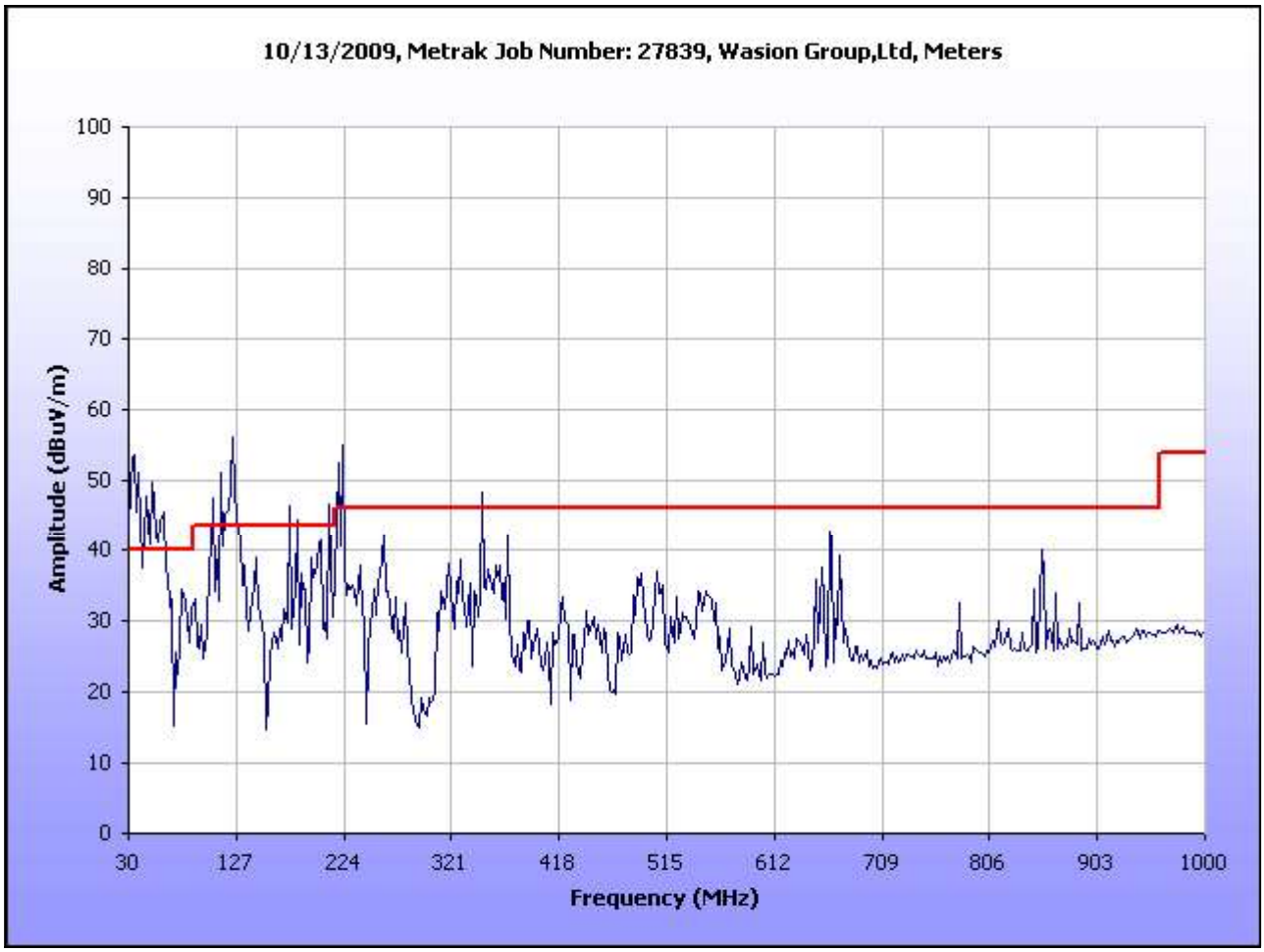
Plot 14. Test No. 27: Radio Frequency Radiated Emissions, Form 2S SN10283, Pre-Scan

Test No. 27: Radio Frequency Radiated Emissions Limits, Test Results, Form 2S SN10285

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected Amplitude (dBuV)	Antenna Correction Factor (dB) (+)	Cable Loss (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
34.366	360	H	1.68	5.42	6.88	1.05	0.00	13.35	40.00	-26.65
34.366	43	V	1.02	17.20	6.32	1.05	0.00	24.57	40.00	-15.43
47.020	360	H	1.51	5.65	9.18	1.06	0.00	15.89	40.00	-24.11
47.020	0	V	1.28	5.65	8.84	1.06	0.00	15.55	40.00	-24.45
57.020	360	H	1.52	5.80	9.86	1.11	0.00	16.77	40.00	-23.23
57.020	0	V	1.48	5.80	10.48	1.11	0.00	17.39	40.00	-22.61
103.136	17	H	1.60	13.40	7.59	1.36	0.00	22.35	43.50	-21.15
103.136	343	V	1.20	22.56	7.49	1.36	0.00	31.41	43.50	-12.09
123.174	324	H	1.76	20.00	7.43	1.42	0.00	28.85	43.50	-14.65
123.174	28	V	1.02	21.97	7.79	1.42	0.00	31.18	43.50	-12.32
181.739	233	H	1.83	12.08	9.54	1.63	0.00	23.24	43.50	-20.26
181.739	93	V	1.16	15.00	8.97	1.63	0.00	25.59	43.50	-17.91
217.780	0	H	1.79	7.80	10.54	1.76	0.00	20.11	46.00	-25.89
217.780	28	V	1.45	12.00	10.56	1.76	0.00	24.32	46.00	-21.68
261.180	0	H	1.40	4.61	12.83	2.27	0.00	19.71	46.00	-26.29
261.180	0	V	1.11	8.61	12.38	2.27	0.00	23.26	46.00	-22.74
344.333	360	H	1.90	4.94	14.35	2.64	0.00	21.93	46.00	-24.07
344.333	0	V	1.20	5.02	14.57	2.64	0.00	22.23	46.00	-23.77
663.000	0	H	1.53	5.57	20.24	3.74	0.00	29.55	46.00	-16.45
663.000	360	V	1.48	5.57	20.00	3.74	0.00	29.31	46.00	-16.69

Table 102. Test No. 27: Radio Frequency Radiated Emissions, Form 2S SN10285, Test Results

Meter Functionally Verified



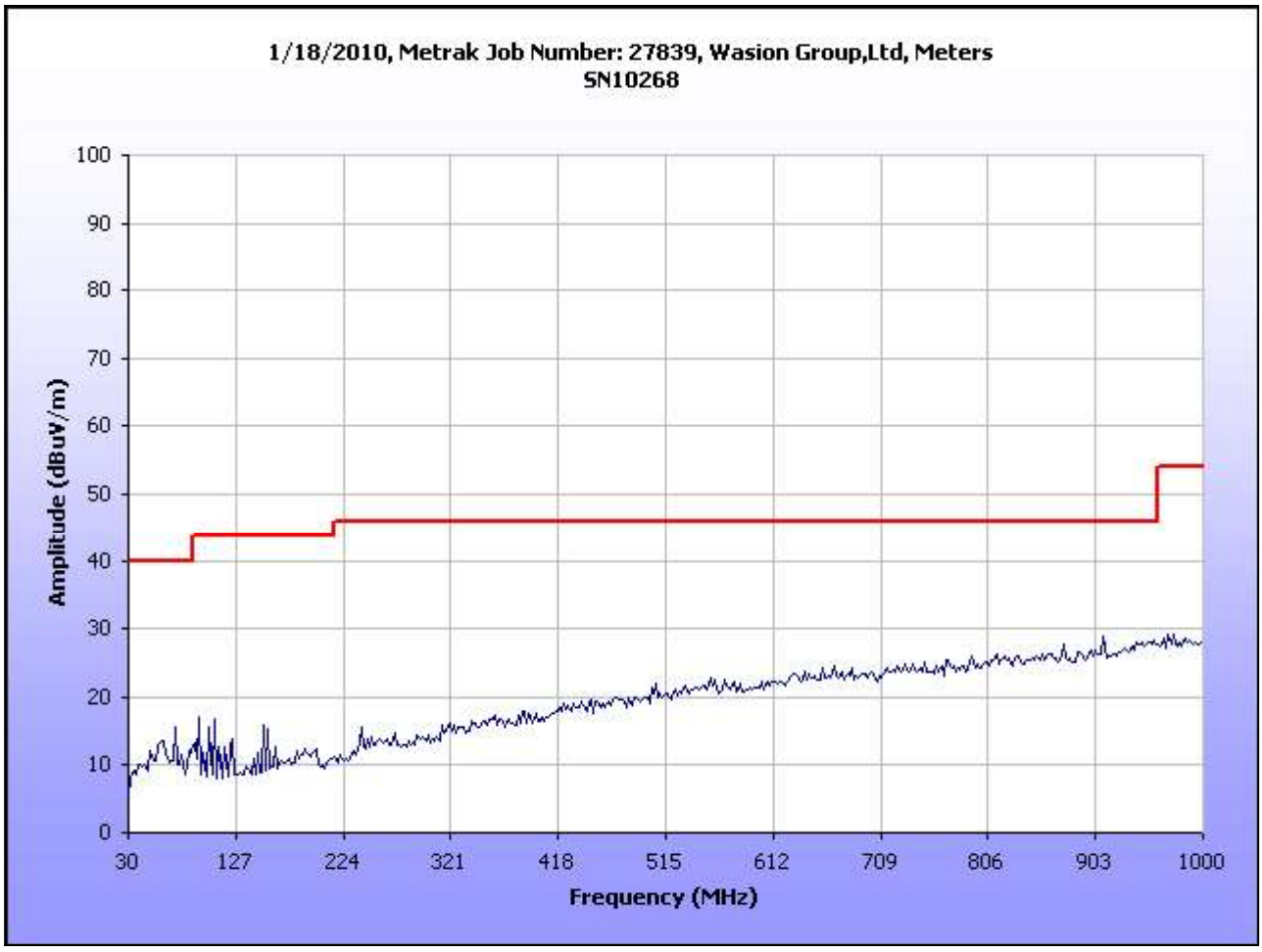
Plot 15. Test No. 27: Radio Frequency Radiated Emissions, Form 2S SN10285, Pre-Scan

Test No. 27: Radio Frequency Radiated Emissions Limits, Test Results, Form 2S SN10268

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected Amplitude (dBuV)	Antenna Correction Factor (dB) (+)	Cable Loss (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
58.961	46	H	1.30	5.26	10.02	0.23	10.46	5.05	39.00	-33.95
58.961	90	V	1.01	6.16	10.75	0.23	10.46	6.68	39.00	-32.32
87.997	219	H	1.02	5.18	6.56	0.23	10.46	1.51	39.00	-37.49
87.997	272	V	1.15	7.90	6.82	0.23	10.46	4.49	39.00	-34.51
125.379	101	H	1.07	5.18	7.49	0.23	10.46	2.44	43.50	-41.06
125.379	287	V	1.33	5.26	7.92	0.23	10.46	2.95	43.50	-40.55
199.467	103	H	1.14	6.02	10.20	0.23	10.46	5.99	43.50	-37.51
199.467	7	V	1.53	6.02	10.08	0.23	10.46	5.87	43.50	-37.63
244.148	162	H	1.18	4.35	11.91	0.44	10.46	6.24	46.40	-40.16
244.148	248	V	1.49	4.35	12.21	0.44	10.46	6.54	46.40	-39.86
510.330	125	H	1.43	5.34	17.11	1.00	10.46	12.99	46.40	-33.41
510.330	5	V	1.18	5.34	17.11	1.00	10.46	12.99	46.40	-33.41

Table 103. Test No. 27: Radio Frequency Radiated Emissions, Form 2S SN10268, Test Results

Meter Functionally Verified



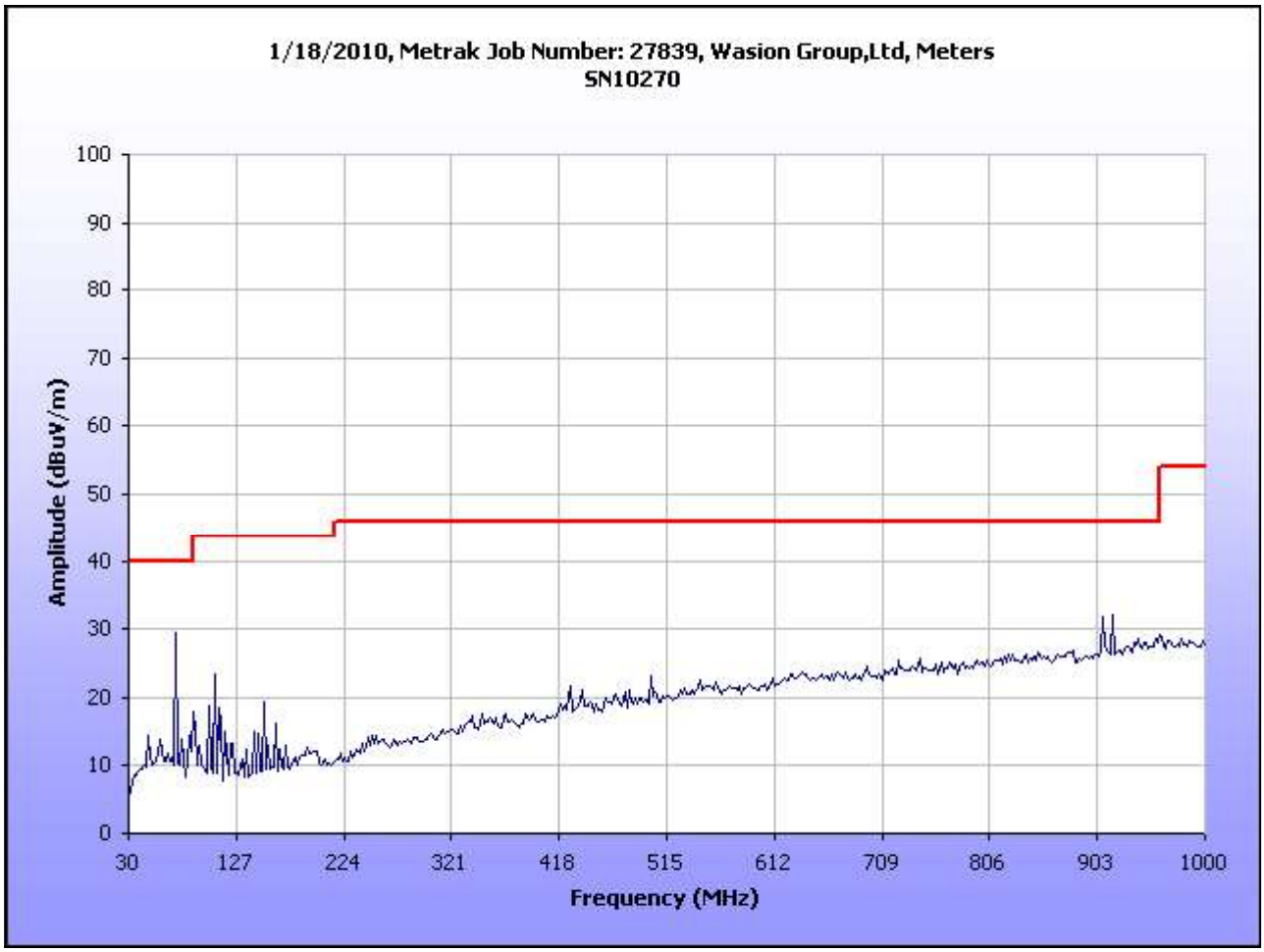
Plot 16. Test No. 27: Radio Frequency Radiated Emissions, Form 2S SN10268, Pre-Scan

Test No. 27: Radio Frequency Radiated Emissions Limits, Test Results, Form 2S SN10270

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected Amplitude (dBuV)	Antenna Correction Factor (dB) (+)	Cable Loss (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
49.109	1	H	1.74	5.26	9.26	0.23	0.00	14.75	40.00	-25.25
49.109	95	V	1.00	6.51	9.09	0.23	0.00	15.83	40.00	-24.17
70.097	335	H	1.00	5.50	9.58	0.23	0.00	15.31	40.00	-24.69
70.097	9	V	1.51	5.50	8.59	0.23	0.00	14.32	40.00	-25.68
87.997	319	H	1.49	5.18	6.56	0.23	0.00	11.97	40.00	-28.03
87.997	132	V	1.00	9.25	6.82	0.23	0.00	16.30	40.00	-23.70
108.039	10	H	1.25	5.50	7.28	0.23	0.00	13.01	43.50	-30.49
108.039	256	V	1.00	13.80	7.54	0.23	0.00	21.57	43.50	-21.93
147.201	11	H	1.40	5.42	8.09	0.23	0.00	13.74	43.50	-29.76
147.201	93	V	1.10	8.89	7.66	0.23	0.00	16.78	43.50	-26.72
502.797	138	H	1.06	5.42	17.16	1.00	0.00	23.58	46.00	-22.42
502.797	86	V	1.20	5.42	17.20	1.00	0.00	23.62	46.00	-22.38

Table 104. Test No. 27: Radio Frequency Radiated Emissions, Form 2S SN10270, Test Results

Meter Functionally Verified



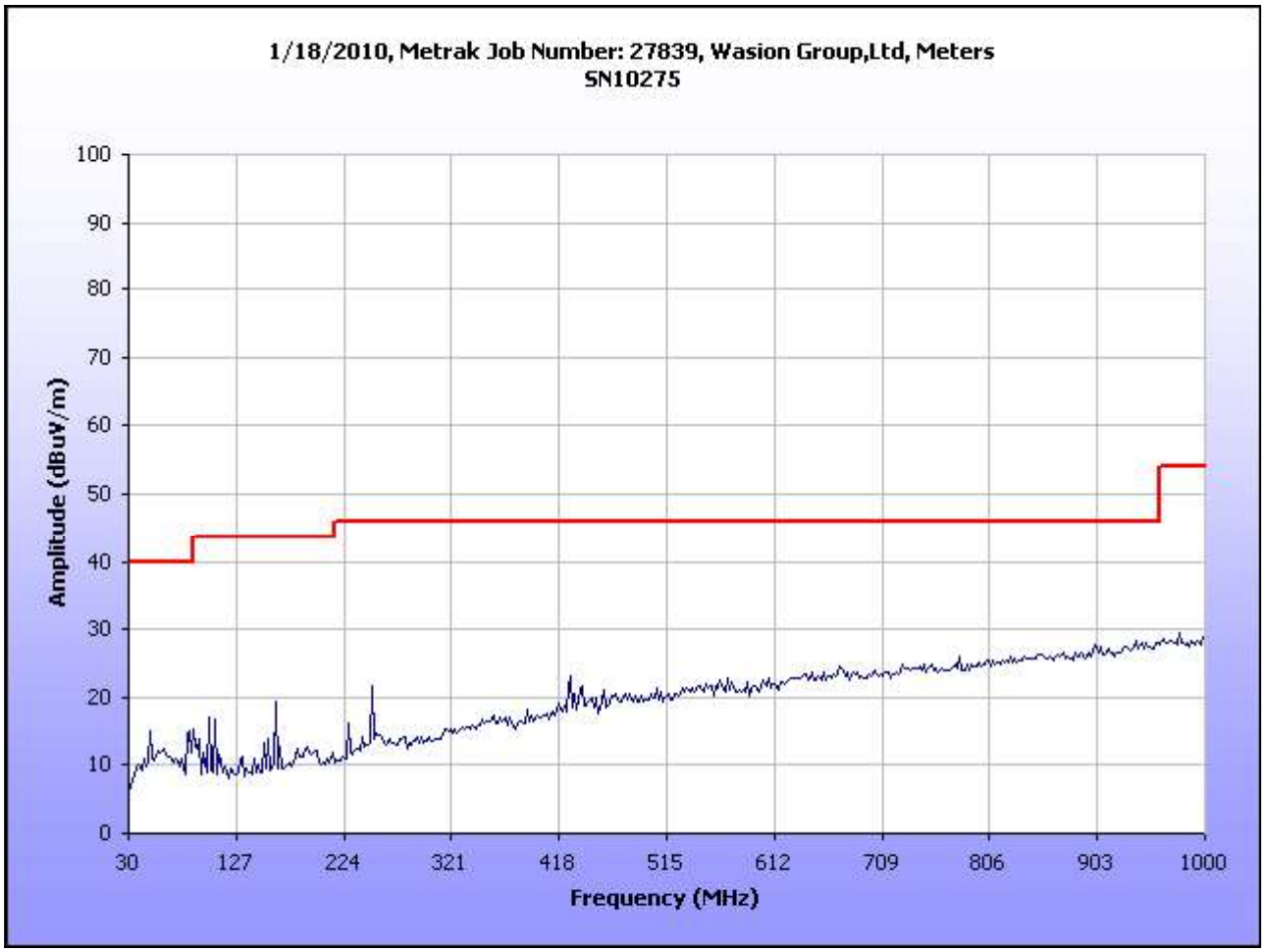
Plot 17. Test No. 27: Radio Frequency Radiated Emissions, Form 2S SN10270, Pre-Scan

Test No. 27: Radio Frequency Radiated Emissions Limits, Test Results, Form 2S SN10275

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected Amplitude (dBuV)	Antenna Correction Factor (dB) (+)	Cable Loss (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
49.105	359	H	2.46	5.34	9.26	0.23	0.00	14.83	40.00	-25.17
49.105	70	V	1.01	7.72	9.09	0.23	0.00	17.04	40.00	-22.96
87.988	301	H	1.32	5.18	6.56	0.23	0.00	11.97	40.00	-28.03
87.988	195	V	1.01	10.67	6.82	0.23	0.00	17.72	40.00	-22.28
107.992	0	H	2.19	5.50	7.28	0.23	0.00	13.01	43.50	-30.49
107.992	222	V	1.00	10.50	7.54	0.23	0.00	18.27	43.50	-25.23
162.061	358	H	1.90	5.34	8.06	0.23	0.00	13.63	43.50	-29.87
162.061	87	V	1.03	10.63	8.46	0.23	0.00	19.32	43.50	-24.18
247.180	18	H	1.55	4.26	12.31	0.47	0.00	17.03	46.00	-28.97
247.180	272	V	1.70	4.35	12.61	0.47	0.00	17.42	46.00	-28.58
423.233	2	H	1.02	4.61	16.09	0.99	0.00	21.69	46.00	-24.31
423.233	360	V	1.00	4.52	16.64	0.99	0.00	22.14	46.00	-23.86

Table 105. Test No. 27: Radio Frequency Radiated Emissions, Form 2S SN10275, Test Results

Meter Functionally Verified



Plot 18. Test No. 27: Radio Frequency Radiated Emissions, Form 2S SN10270, Pre-Scan

Test No. 27: Radio Frequency Radiated Emission Limits Test Setup

Photograph 33. Test No. 27: Radio Frequency Radiated Emissions Limits Test Setup

Photograph 34. Test No. 27: Radio Frequency Radiated Emissions Limits, Retest Setup

Test No. 28: Effect of Electrostatic Discharge (ESD)

Test Requirement(s): **ANSI C12.1 4.7.3.14** The metering device shall not exhibit a change in the least significant digit in its internal registers and will continue to operate normally after subjected to at least ten air-discharges of up to ±15 kV, applied through air (Severity Level 4).

Test Procedures: The EUT was installed above a ground reference plane (GRP) with a thickness of at least 0.25 mm, thus satisfying the requirements of *IEC 61000-4-2*.

Air-discharges of up to ±15 kV were applied to the EUT and housing unit. Negative and positive discharges were applied at least ten times to each selected discharge point.

Discharges were only applied to such points and surfaces of the metering device that are normally accessible with the cover on. The proper operation of the EUT was determined after each test.

Test Results: The EUT was compliant with the requirement(s) of this section.

Test Engineer(s): Francis Chau

Test Date(s): 02/03/10

Test No. 28: Effect of Electrostatic Discharge, Form 2S, SN10268, Test Results

Test date:	Wednesday, February 03, 2010
Test Engineer:	FC
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1:2008
Setup Verification:	FC On 2/3/2010
Photo Filename:	ESD 27839
Compliance Date:	2/3/2010

EUT Descriptor:	Watthour Meters
Model number:	Libra
Serial number:	20081165010268
Meter Form Factor:	Form 2S
Meter Class:	CL200
Rated Voltage (fixed or range):	240VAC
Mode & Monitoring:	Meter LCD Display
Modifications:	Series Test, none allowable

Environmental:		Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions):	
		20°C	32%	102.3mBar	-	
Parametric:	Air Discharges	Discharge Potential	Number of Discharges		AC to Voltage circuits	Current thru Current circuits:
		15kV	10		120Vrms	0Amp.

Test Results

Meter Surface	Polarity	Pass/Fail (note all anomalies)
Face (front)	positive	Pass
	negative	Pass
Left Side	positive	Pass
	negative	Pass
Rigth Side	positive	Pass
	negative	Pass

Meter Surface	Polarity	Pass/Fail (note all anomalies)
Top	positive	Pass
	negative	Pass
Bottom	positive	Pass
	negative	Pass
Others (describe)	positive	N/A
	negative	N/A

* Note: ESD air discharges are applied only to surface points normally accessible as a field deployed meter.

Registration at Start	Registration at End
0.0 kWh	0.0 kWh
Net Totalization	Meter functionality
0.000	Pass

Table 106. Test No. 28: Electrostatic Discharge, Form 2S, SN10268, Test Results

Meter Functionally Verified

Test No. 28: Effect of Electrostatic Discharge, Form 2S, SN10270, Test Results

Test date:	Wednesday, February 03, 2010
Test Engineer:	FC
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1:2008
Setup Verification:	FC On 2/3/2010
Photo Filename:	ESD 27839
Compliance Date:	2/3/2010

EUT Descriptor:	Watthour Meters
Model number:	Libra
Serial number:	20081165010270
Meter Form Factor:	Form 2S
Meter Class:	CL200
Rated Voltage (fixed or range):	240VAC
Mode & Monitoring:	Meter LCD Display
Modifications:	Series Test, none allowable

Environmental:		Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions):	
		20°C	32%	102.3mBar	-	
Parametric:	Air Discharges	Discharge Potential	Number of Discharges		AC to Voltage circuits	Current thru Current circuits:
		15kV	10		120Vrms	0Amp.

Test Results

Meter Surface	Polarity	Pass/Fail (note all anomalies)
Face (front)	positive	Pass
	negative	Pass
Left Side	positive	Pass
	negative	Pass
Rigth Side	positive	Pass
	negative	Pass

Meter Surface	Polarity	Pass/Fail (note all anomalies)
Top	positive	Pass
	negative	Pass
Bottom	positive	Pass
	negative	Pass
Others (describe)	positive	N/A
	negative	N/A

* Note: ESD air discharges are applied only to surface points normally accessible as a field deployed meter.

Registration at Start	Registration at End
0.0 kWh	0.0 kWh
Net Totalization	Meter functionality
0.000	Pass

Table 107. Test No. 28: Electrostatic Discharge, Form 2S, SN10270, Test Results

Meter Functionally Verified

Test No. 28: Effect of Electrostatic Discharge, Form 2S, SN10275, Test Results

Test date:	Wednesday, February 03, 2010
Test Engineer:	FC
Metrak # :	27839
Customer:	Wasion Group,Ltd
Specifications:	ANSI C12.1:2008
Setup Verification:	FC On 2/3/2010
Photo Filename:	ESD 27839
Compliance Date:	2/3/2010

EUT Descriptor:	Watthour Meters
Model number:	Libra
Serial number:	20081165010275
Meter Form Factor:	Form 2S
Meter Class:	CL200
Rated Voltage (fixed or range):	240VAC
Mode & Monitoring:	Meter LCD Display
Modifications:	Series Test, none allowable

Environmental:		Temperature:	Relative Humidity:	Barometric Pressure	Others (Specifically Required Conditions):	
		20°C	32%	102.3mBar	-	
Parametric:	Air Discharges	Discharge Potential	Number of Discharges		AC to Voltage circuits	Current thru Current circuits:
		15kV	10		120Vrms	0Amp.

Test Results

Meter Surface	Polarity	Pass/Fail (note all anomalies)
Face (front)	positive	Pass
	negative	Pass
Left Side	positive	Pass
	negative	Pass
Rigth Side	positive	Pass
	negative	Pass

Meter Surface	Polarity	Pass/Fail (note all anomalies)
Top	positive	Pass
	negative	Pass
Bottom	positive	Pass
	negative	Pass
Others (describe)	positive	N/A
	negative	N/A

* Note: ESD air discharges are applied only to surface points normally accessible as a field deployed meter.

Registration at Start	Registration at End
0.0 kWh	0.0 kWh
Net Totalization	Meter functionality
0.000	Pass

Table 108. Test No. 28: Electrostatic Discharge, Form 2S, SN10275, Test Results

Meter Functionally Verified

Test No. 28: Effect of Electrostatic Discharge (ESD) Test Setup

Photograph 35. Test No. 28: Effect of Electrostatic Discharge (ESD) Test Setup

Test No. 29: Effect of Storage Temperature

Test Requirement(s): **4.7.3.15 of ANSI C12.1-2001:** The metering device shall not be damaged and shall conform to the manufacturer's specification after being subjected to the following tests. The storage temperatures are as specified by the manufacturer. If the operating temperature range is the same as the storage temperature range, then this test can be omitted.

Test Procedures: The metering device enclosure door or cover shall be closed (normal operating position) for the duration of the test. The metering device shall not be powered nor operating for the duration of the test. The test duration shall be 168 hours. The temperature shall be cycled once each 24 hours, as described below. The temperature ramping shall be smooth and continuous. The rate of temperature change during ramping shall not exceed 20°C, per hour. The daily temperature cycle shall be conducted as follows:

A. Ramp up from room ambient to the Maximum Storage Temperature, T stor-Max in approximately 3 hours.

B. Soak at T Stor-Max for approximately 11 hours.

C. Ramp down to Minimum Storage Temperature, T stor-Min in approximately 6 hours.

D. Soak at T stor-min for approximately 3 hours.

E. Ramp up to room ambient, in approximately 2 hours.

Test Results: The EUT was not applicable with the requirement(s) of this section. According to the Libra-1b single phase manual on page 24, the storage temperature range is the same as the operating temperature range of -30 C to +70 C.

Test No. 30: Effects of Variation of Operating Temperature

Test Requirement(s): **ANSI C12.1 4.7.3.16 -** The meter should operate continuously during exposure to the conditions of the test. The measured deviations in accuracy should be within the specified limits for accuracy during the test.

Test Procedures: The EUT was tested in its normal operating configuration in a rated enclosure. The EUT was energized during testing. The EUT was exposed to the following 24-hour cycles for 7 days:

- Room ambient to $T_{oper\text{-}Max}$ in 3 hours.
- Soak at $T_{oper\text{-}Max}$ for 11 hours.
- Ramp down to $T_{store\text{-}Min}$ in 6 hours
- Soak at $T_{store\text{-}Min}$ in 3 hours
- Ramp to room ambient in 2 hours.

T opera-Max	T opera-Min
70ºC	-30ºC

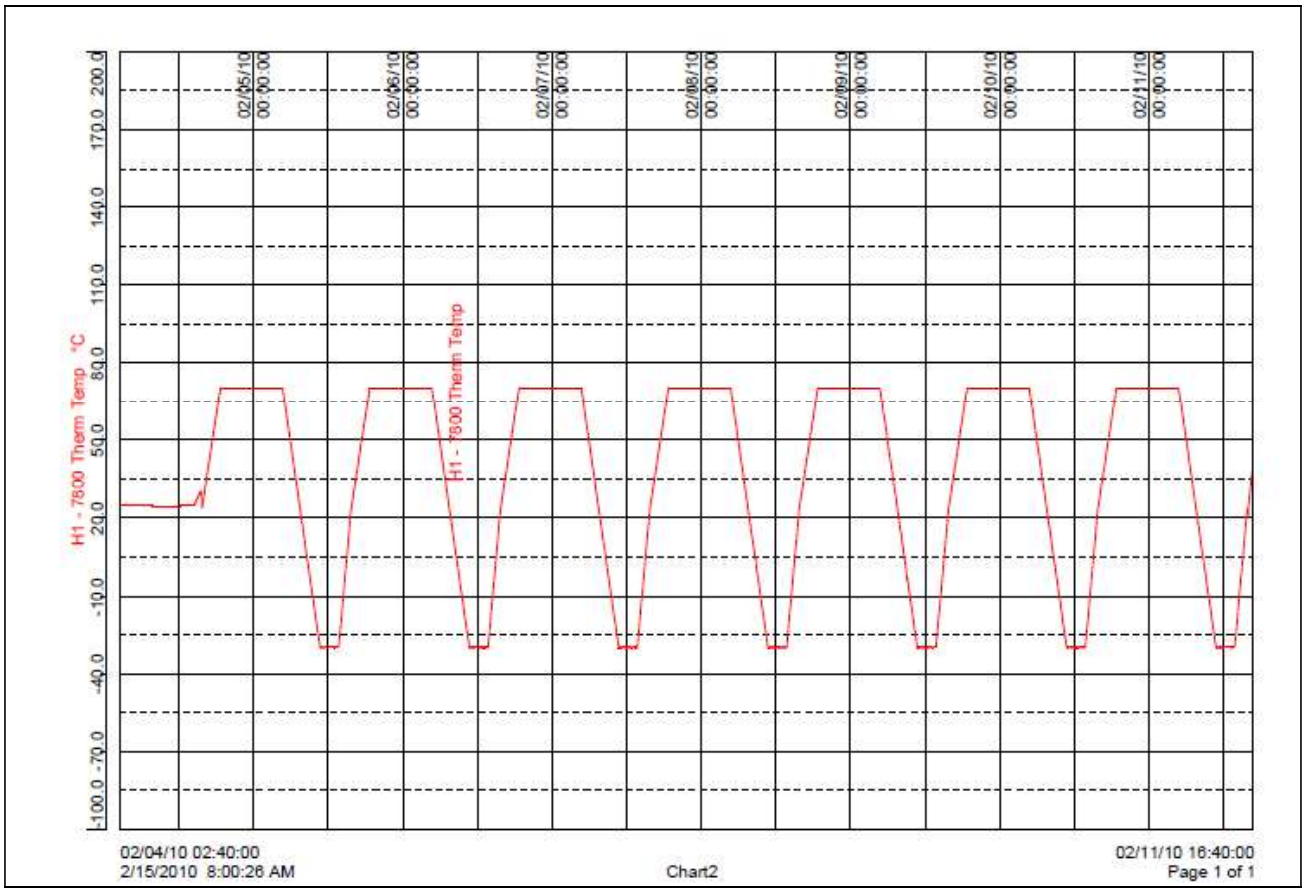
Test Results: The EUT was compliant with the requirement(s) of this section.

Test Engineer(s): William Murphy

Test Date(s): 10/14/09 to 02/15/10

Test: 30 Operating Temperature Customer: Wasion Job Number: 27839			
	Sample 1	Sample 2	Sample 3
Model:	Libra	Libra	Libra
Serial Number:	x270	x268	x275
Current Class:	200	200	200
Form:	2S	2S	2S
Test Voltage:	240	240	240
Test Current:	3	3	3
Direction of Current:	Forward	Forward	Forward
# of Current Coils:	2	2	2
Expected Duration (Hrs):	168	168	168
Expected Delta (kWh):	242	242	242
Pre kWh value:	63	65	65
Post kWh value:	304	307	307
Actual Delta (kWh):	241	242	242
Operated Normally:	Yes	Yes	Yes
Visible Damage:	No	No	No
Result:	Pass	Pass	Pass

Table 109. Test No. 30: Effects of Variation of Operating Temperature, Test Results



Plot 19. Test No. 30: Effects of Variation of Operating Temperature, Test Data

Test: Performance Verifcation
Customer: Waison
Model: Libra
S/N: x268
Meter Form: 2S
Meter Class: 200
Voltage: 240V
Job Number: 27839

volt	amp	phase_angle	freq	% reg	% error
240V	30	0	60	100.038	0.038
240V	3	0	60	100.048	0.048
240V	30	300	60	100.034	0.034

* Before Test 30 Effect of Operating Temperature

Table 110. Test No. 30: Effects of Variation of Operating Temperature, Pre-Test, Meter Serial No. 10268

Test: Performance Verifcation
Customer: Waison
Model: Libra
S/N: x268
Meter Form: 2S
Meter Class: 200
Voltage: 240V
Job Number: 27839

volt	amp	phase_angle	freq	% reg	% error
240V	30	0	60	99.9735	-0.0265
240V	3	0	60	100.018	0.018
240V	30	300	60	100.033	0.033

*After Test 31 Effect of Relative Humidity

Table 111. Test No. 30: Effects of Variation of Operating Temperature, Post Test, Meter Serial No. 10268

Test: Performance Verifcation
Customer: Waison
Model: Libra
S/N: x270
Meter Form: 2S
Meter Class: 200
Voltage: 240V
Job Number: 27839

volt	amp	phase_angle	freq	% reg	% error
240V	30	0	60	100.043	0.043
240V	3	0	60	100.046	0.046
240V	30	300	60	100.062	0.062

* Before Test 30 Effect of Operating Temperature

Table 112. Test No. 30: Effects of Variation of Operating Temperature, Pre-Test, Meter Serial No. 10270

Test: Performance Verifcation
Customer: Waison
Model: Libra
S/N: x270
Meter Form: 2S
Meter Class: 200
Voltage: 240V
Job Number: 27839

volt	amp	phase_angle	freq	% reg	% error
240V	30	0	60	99.9830	-0.017
240V	3	0	60	100.010	0.0095
240V	30	0	60	99.9830	-0.017

*After Test 30 Effect of Operating Temperature

Table 113. Test No. 30: Effects of Variation of Operating Temperature, Post Test, Meter Serial No. 10270

Test: Performance Verifcation
Customer: Waison
Model: Libra
S/N: x275
Meter Form: 2S
Meter Class: 200
Voltage: 240V
Job Number: 27839

volt	amp	phase_angle	freq	% reg	% error
240V	30	0	60	100.078	0.078
240V	3	0	60	100.064	0.064
240V	30	300	60	100.115	0.115

* Before Test 30 Effect of Operating Temperature

Table 114. Test No. 30: Effects of Variation of Operating Temperature, Post Test, Meter Serial No. 10275

Test: Performance Verifcation
Customer: Waison
Model: Libra
S/N: x275
Meter Form: 2S
Meter Class: 200
Voltage: 240V
Job Number: 27839

volt	amp	phase_angle	freq	% reg	% error
240V	30	0	60	99.922	-0.0779
240V	3	0	60	99.936	-0.0645
240V	30	300	60	99.965	-0.035

*After Test 30 Effect of Operating Temperature

Table 115. Test No. 30: Effects of Variation of Operating Temperature, Post Test, Meter Serial No. 10275

Photograph 36. Test No. 30: Effects of Variation of Operating Temperature, Performance Verification, Test Setup

Photograph 37. Test No. 30: Effects of Variation of Operating Temperature, Test Setup

Test No. 31: Effects of Relative Humidity

Test Requirement(s): **ANSI C12.1 4.7.3.17** - The meter should operate continuously during exposure to the conditions of the test. The measured deviations in accuracy should be within the specified limits for accuracy during the test.

Test Procedures: The EUT was tested in its normal operating configuration in a rated enclosure. The EUT was energized and operating in a normal manner during testing. The EUT was exposed to the following 24-hour cycles for 3 days.

-Room ambient (25°C, 50%RH) to 40°C, 95%RH in 3 hours.
-Soak at 40°C, 95%RH for 18 hours.
- Ramp down to room ambient in 3 hours.

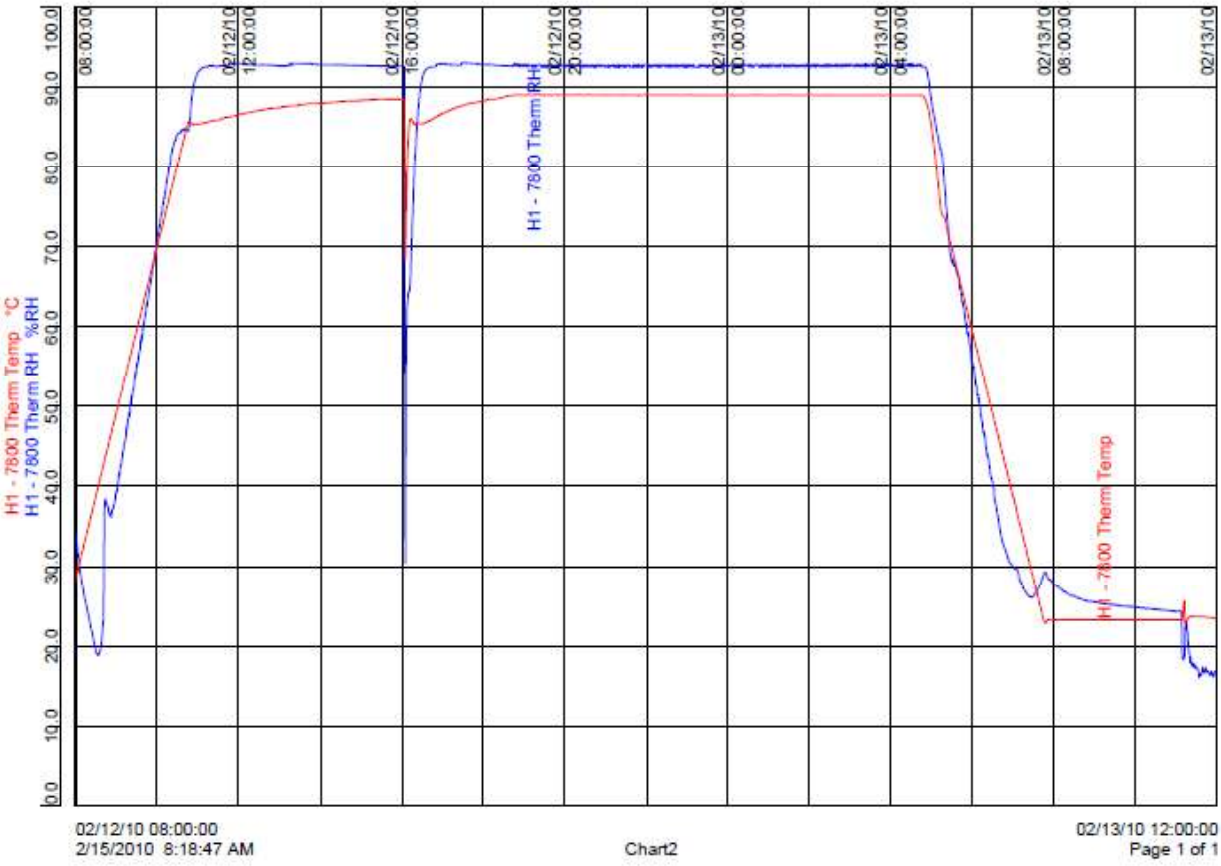
Test Results: The EUT was compliant with the requirements of this section.

Test Engineer(s): William Murphy

Test Date(s): 10/14/09 to 02/15/10

Test: 30 Operating Temperature Customer: Wasion Job Number: 27839			
	Sample 1	Sample 2	Sample 3
Model:	Libra	Libra	Libra
Serial Number:	x270	x268	x275
Current Class:	200	200	200
Form:	2S	2S	2S
Test Voltage:	240	240	240
Test Current:	3	3	3
Direction of Current:	Forward	Forward	Forward
# of Current Coils:	2	2	2
Expected Duration (Hrs):	24	24	24
Expected Delta (kWh):	35	35	35
Pre kWh value:	304	307	307
Post kWh value:	339	342	342
Actual Delta (kWh):	35	35	35
Operated Normally:	Yes	Yes	Yes
Visible Damage:	No	No	No
Result:	Pass	Pass	Pass

Table 116. Test No. 31: Effect of Relative Humidity, Test Results



Plot 20. Test No. 31: Effect of Relative Humidity, Test Data

Photograph 38. Test No. 31: Effects of Variation of Relative Humidity, Test Setup

Test No. 32: Mechanical Shock

Test Requirement(s): **4.7.3.18 of ANSI C12.1-2001:** This test shall be conducted as described in lEG 60068-2-27 revision 1987 based on the following conditions:

-The metering device shall not be operating and shall be without packaging
-The metering device shall be rigidly mounted to a test fixture and the reference point for the control accelerometer shall be attached to the test fixture.
-Half sine pulse applied 3 times in each direction, for each of the 3 mutually perpendicular axis, for a total of 18 shocks. .
-Peak acceleration shall be 15 g (150 m/s2) with a duration of 11 ms with a corresponding velocity change of 1.0 mls.

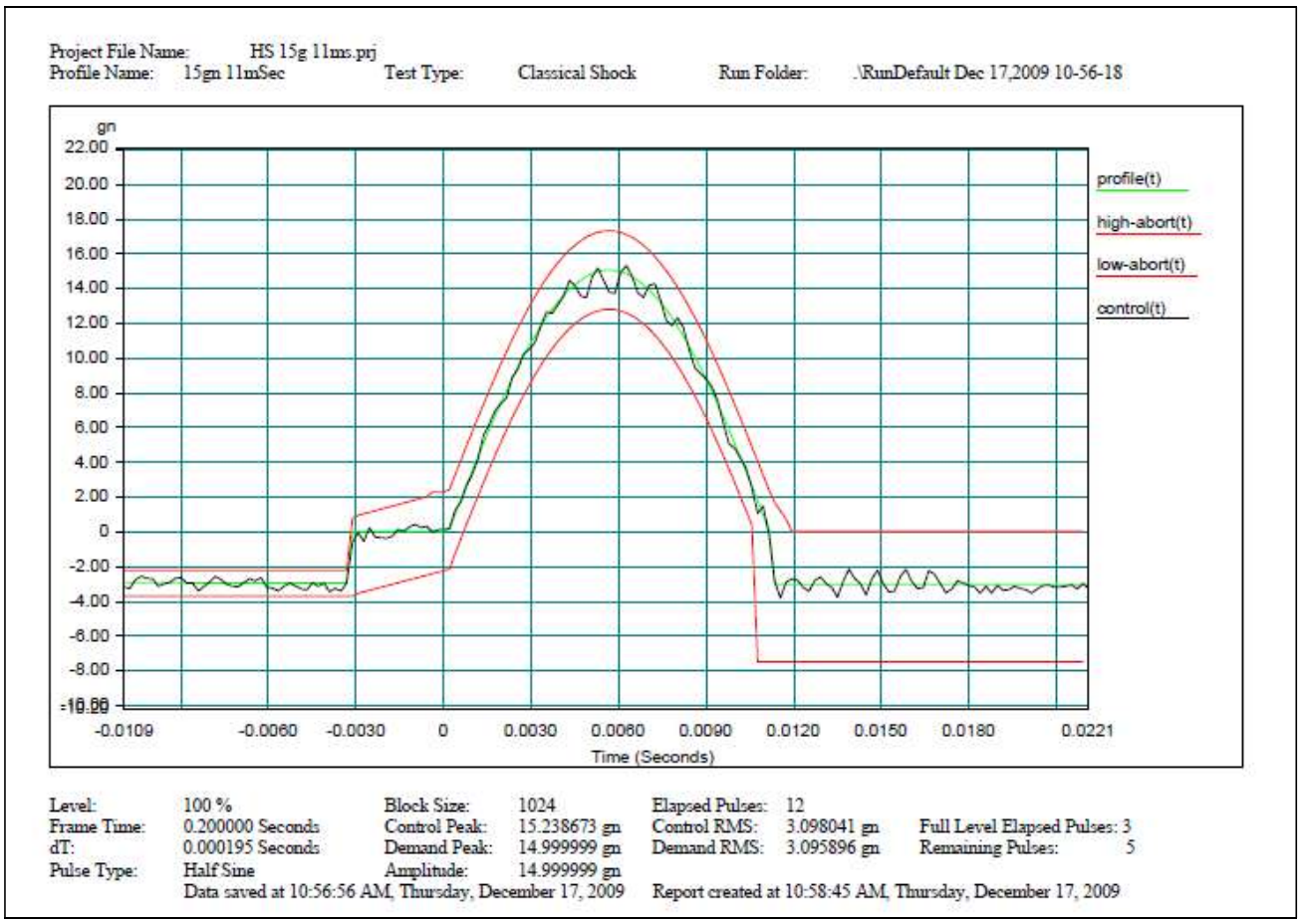
Test Results: The EUT was compliant with the requirement(s) of this section.

Test Engineer(s): William Murphy

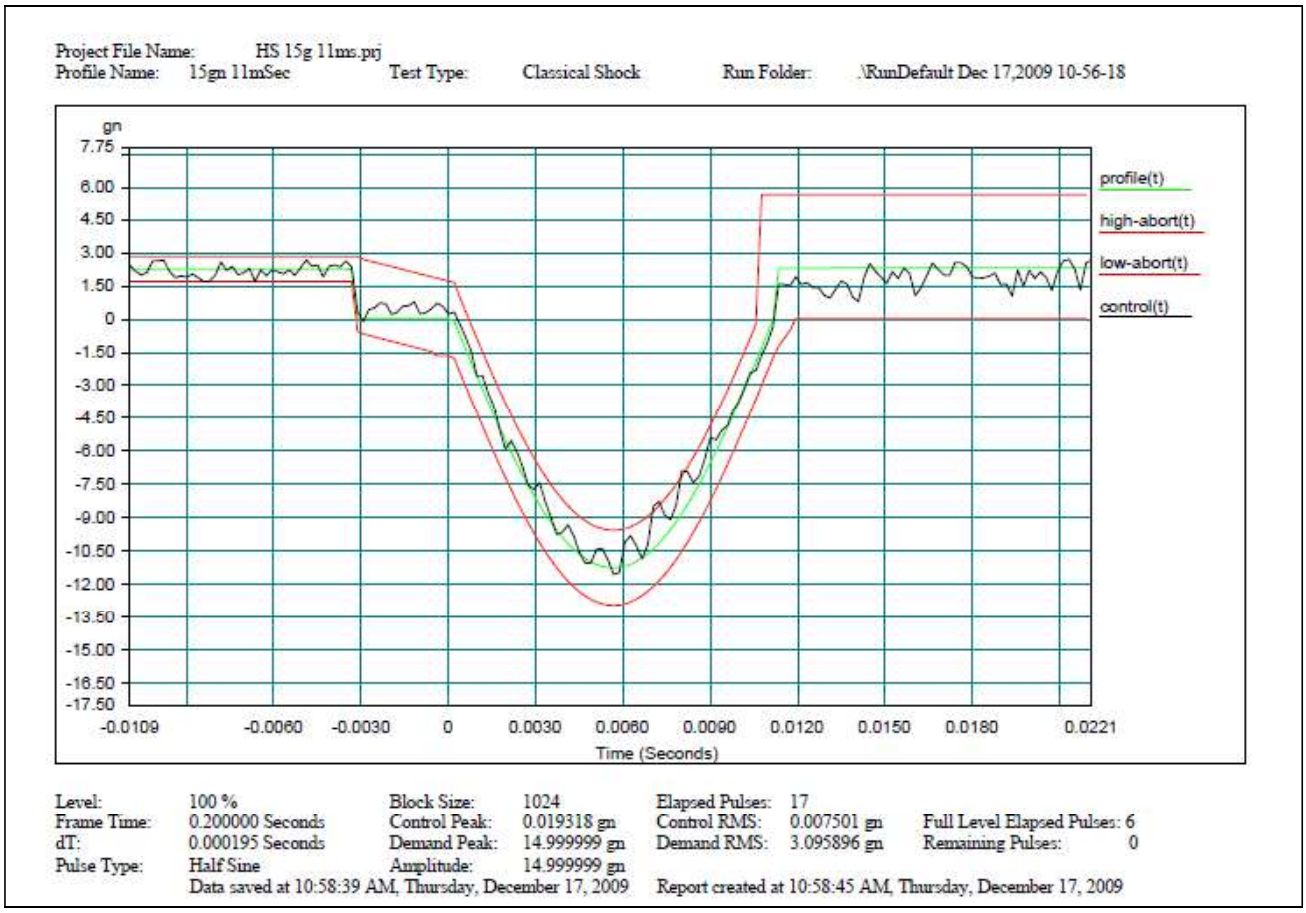
Test Date(s): 10/14/09 to 12/18/09

Test: Mech. Shock Customer: Wasion Model: Libra Job Number: 27839			
1	Serial Number:	x279	
	Voltage:	240V	
	Class:	CL200	
	FM:	2S	
	Any Visible Damage?	No	
2	Serial Number:	x280	
	Voltage:	240V	
	Class:	CL200	
	FM:	2S	
	Any Visible Damage?	No	
3	Serial Number:	x271	
	Voltage:	240V	
	Class:	CL200	
	FM:	2S	
	Any Visible Damage?	No	

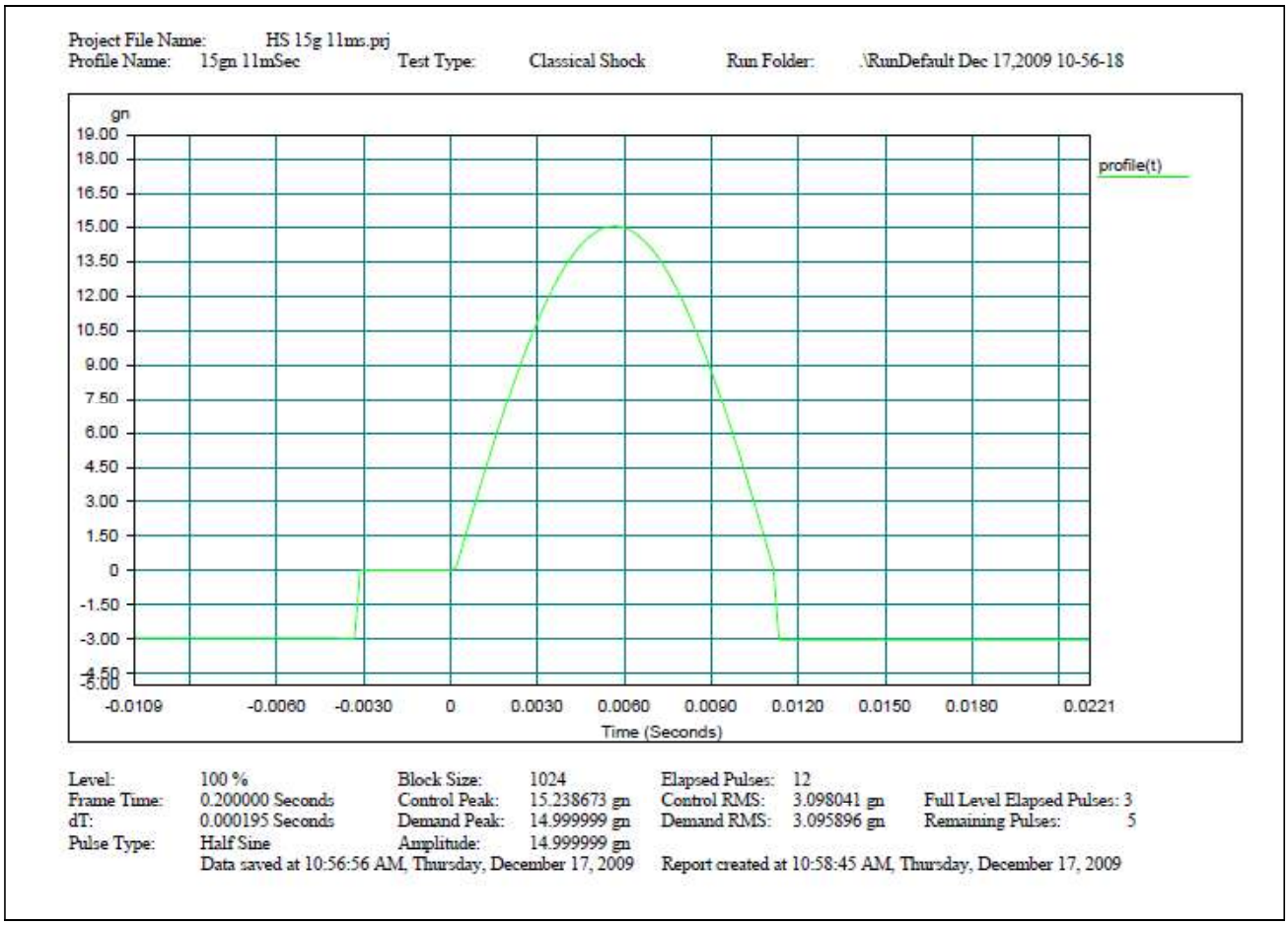
Table 117. Test No. 32: Mechanical Shock, Results



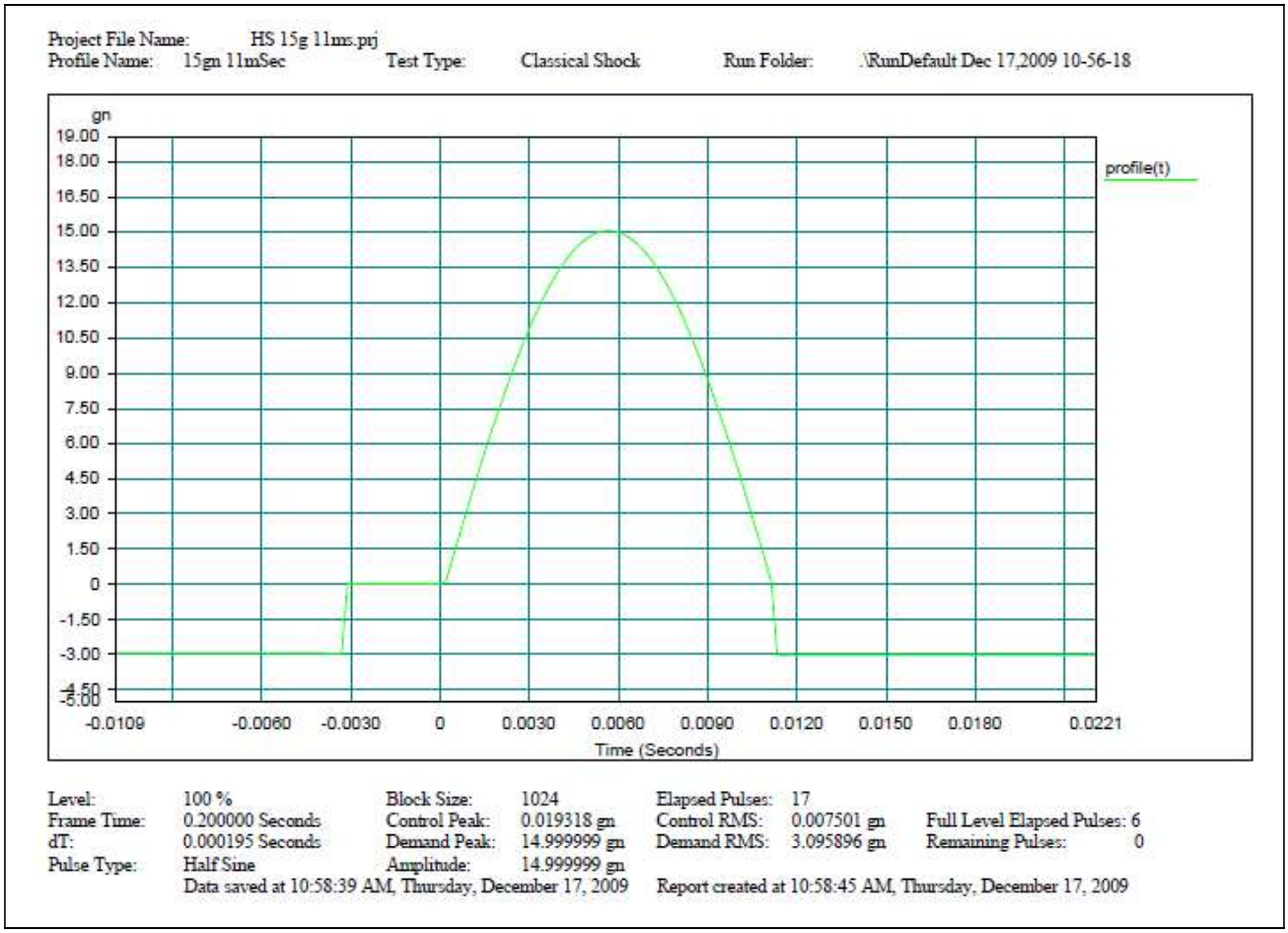
Plot 21. Test No. 32: Mechanical Shock, Positive Shock, X-Axis, Control



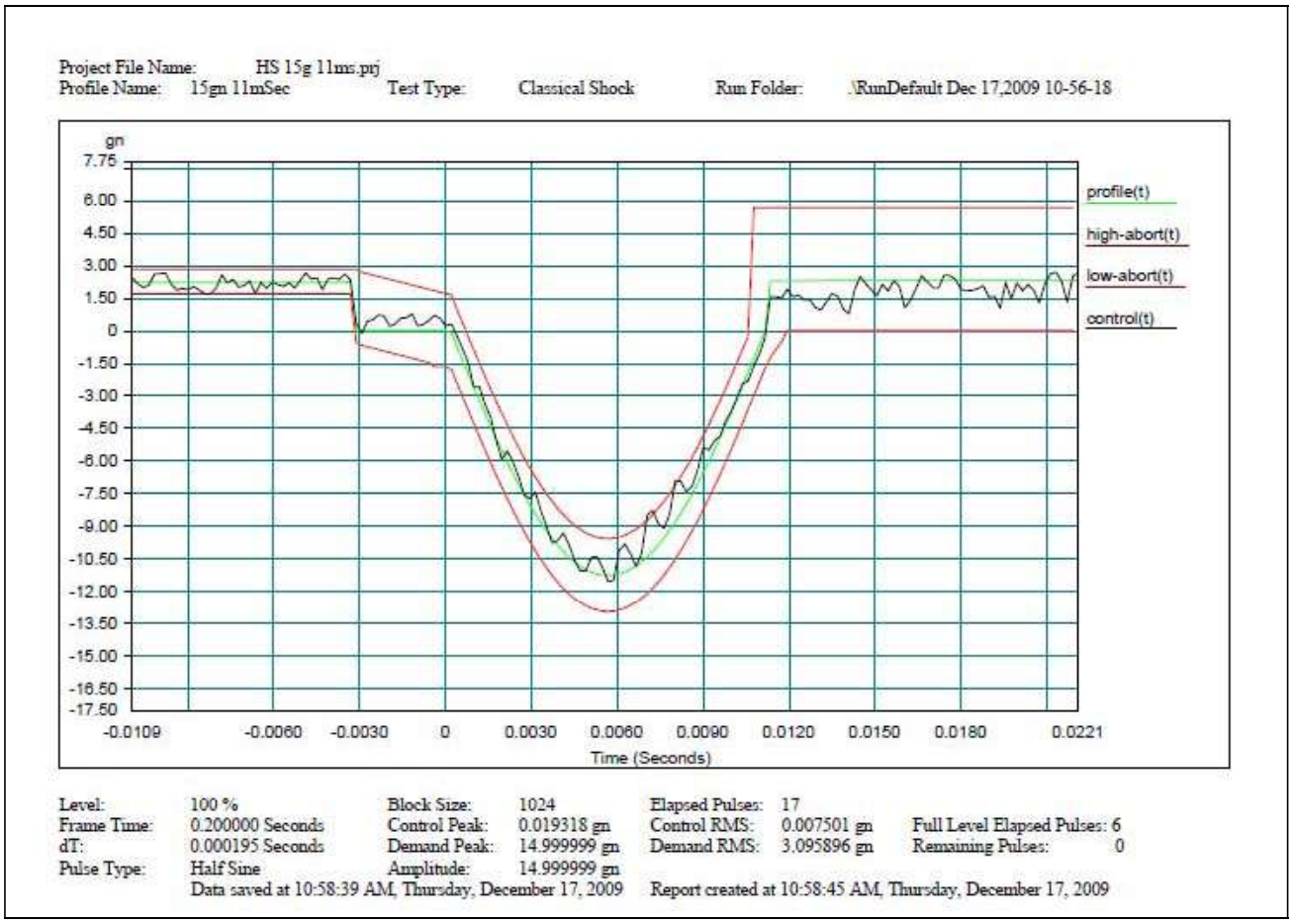
Plot 22. Test No. 32: Mechanical Shock, Negative Shock, X-Axis, Control



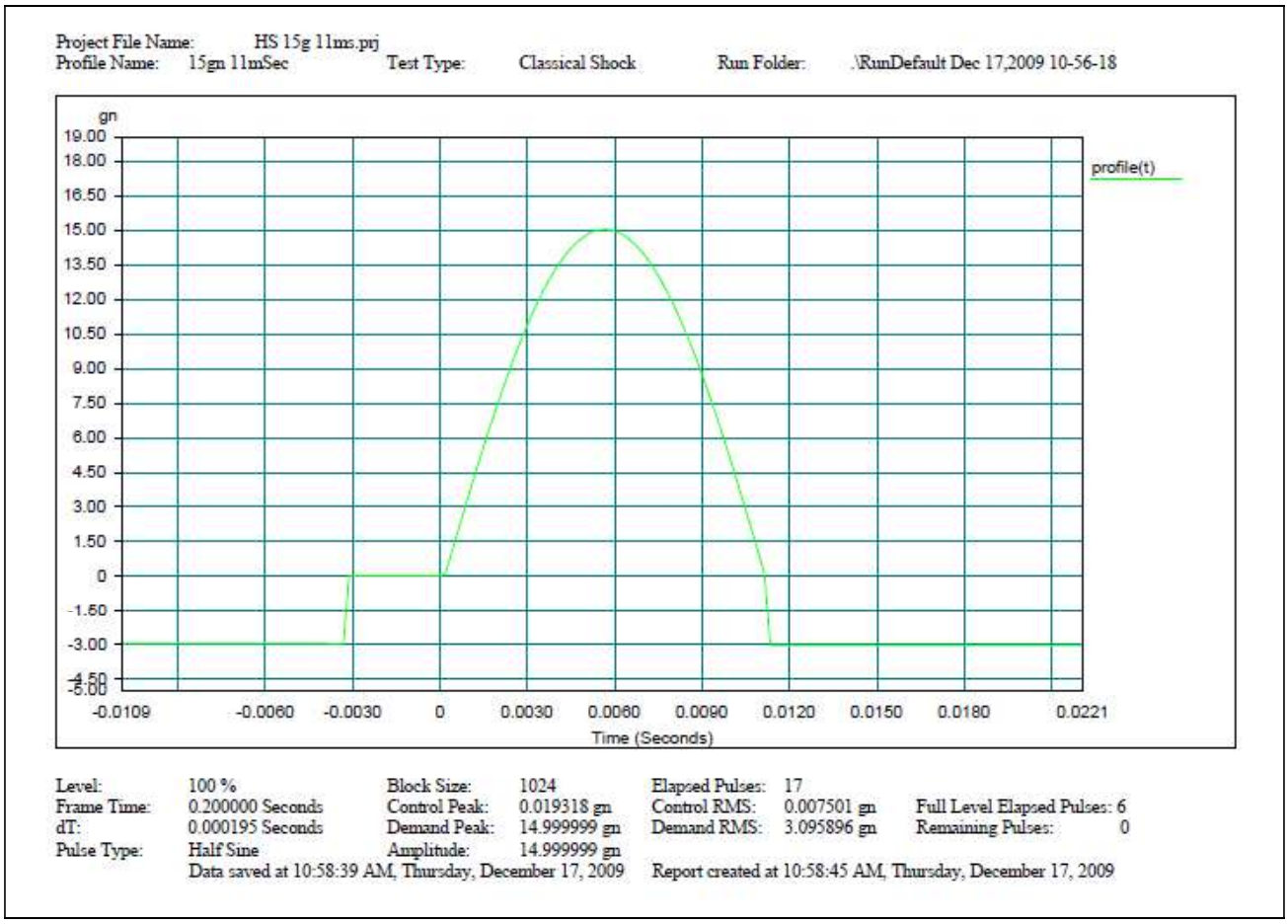
Plot 23. Test No. 32: Mechanical Shock, Positive Shock, X-Axis, Monitor



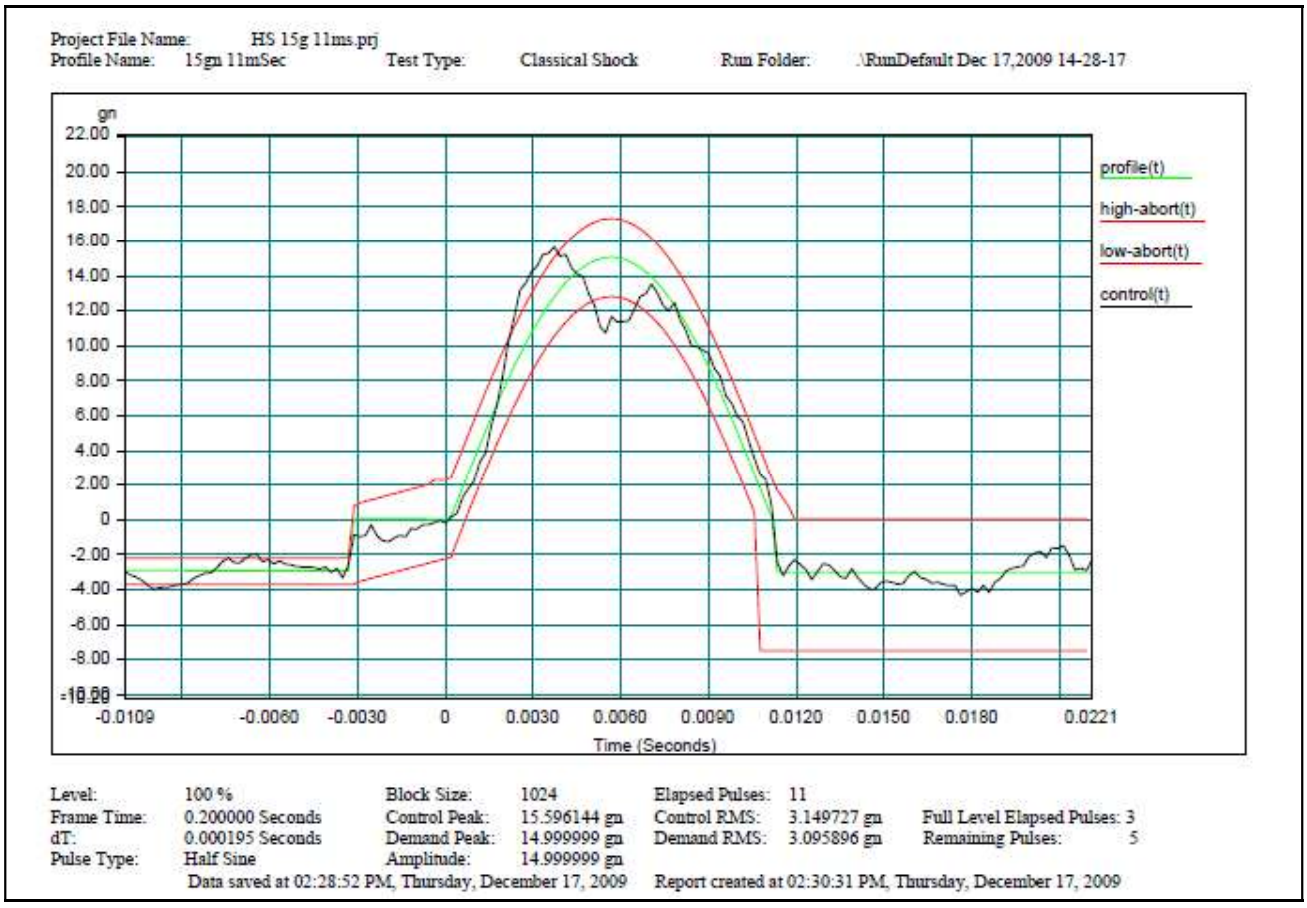
Plot 24. Mechanical Shock, Positive Shock, X-Axis, Monitor - 2



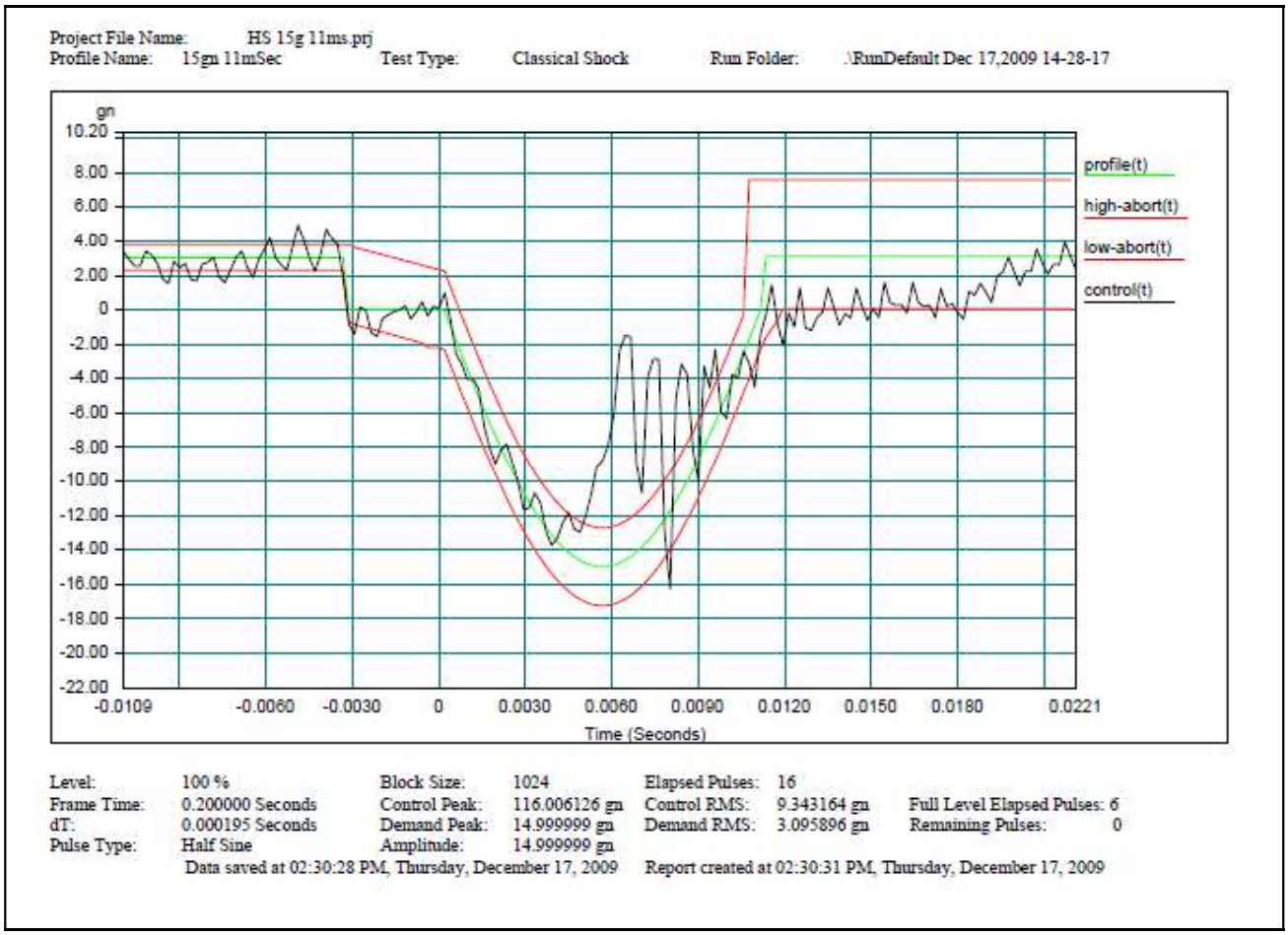
Plot 25. Mechanical Shock, Positive Shock, X-Axis, Control – 2



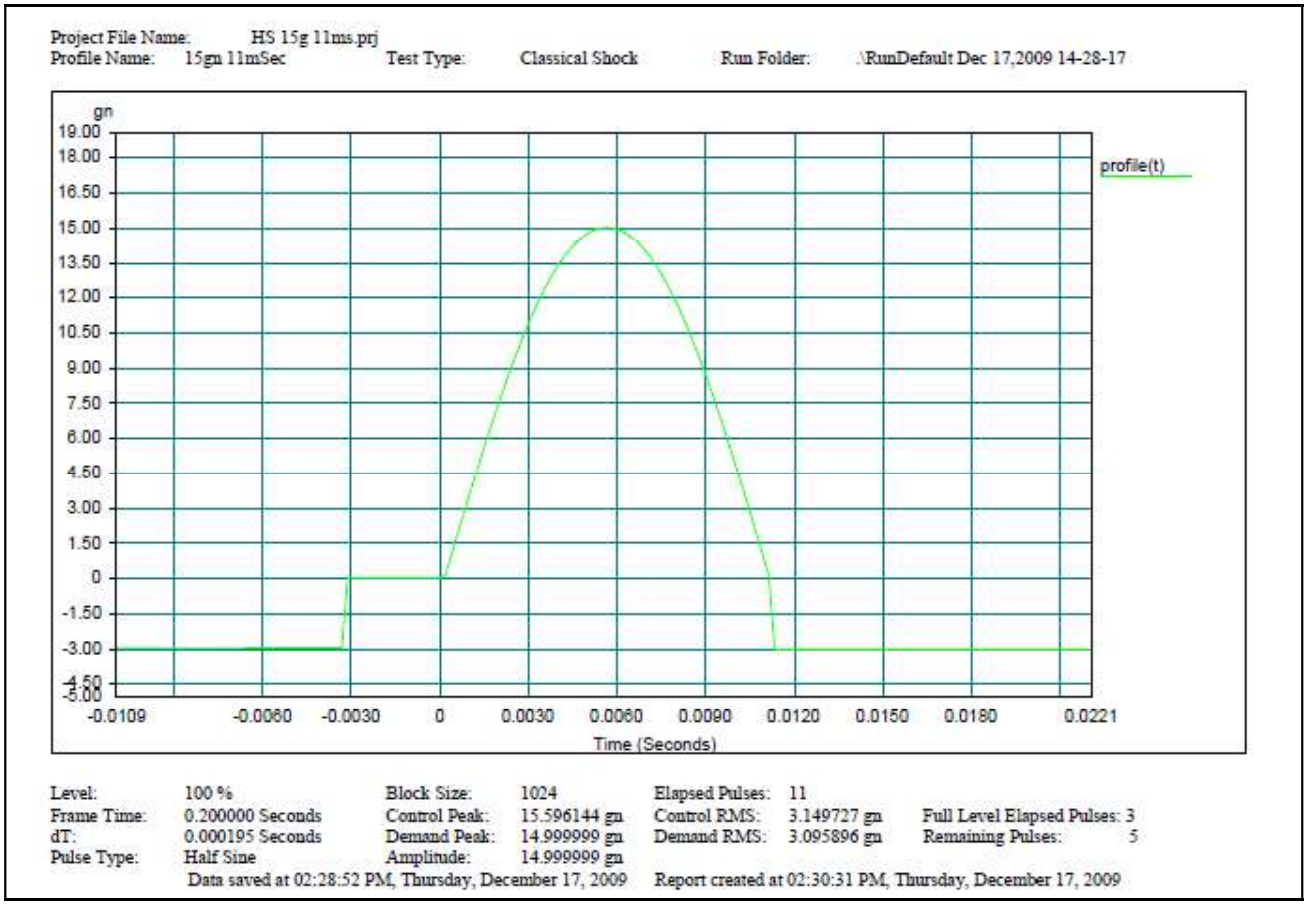
Plot 26. Mechanical Shock, Positive Shock, X-Axis, Monitor – 3



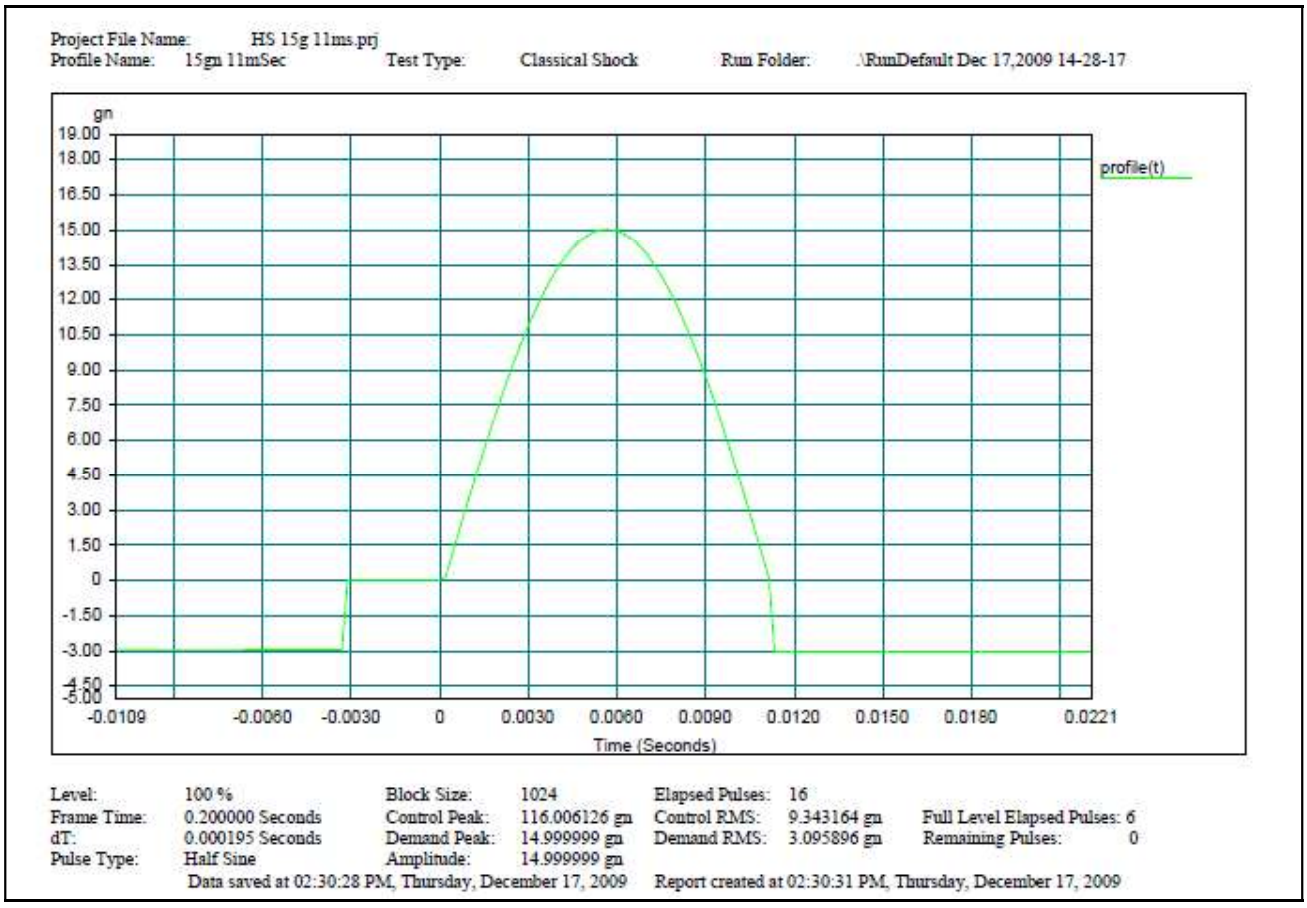
Plot 27. Test No. 32: Mechanical Shock, Positive Shock, Y-Axis, Control



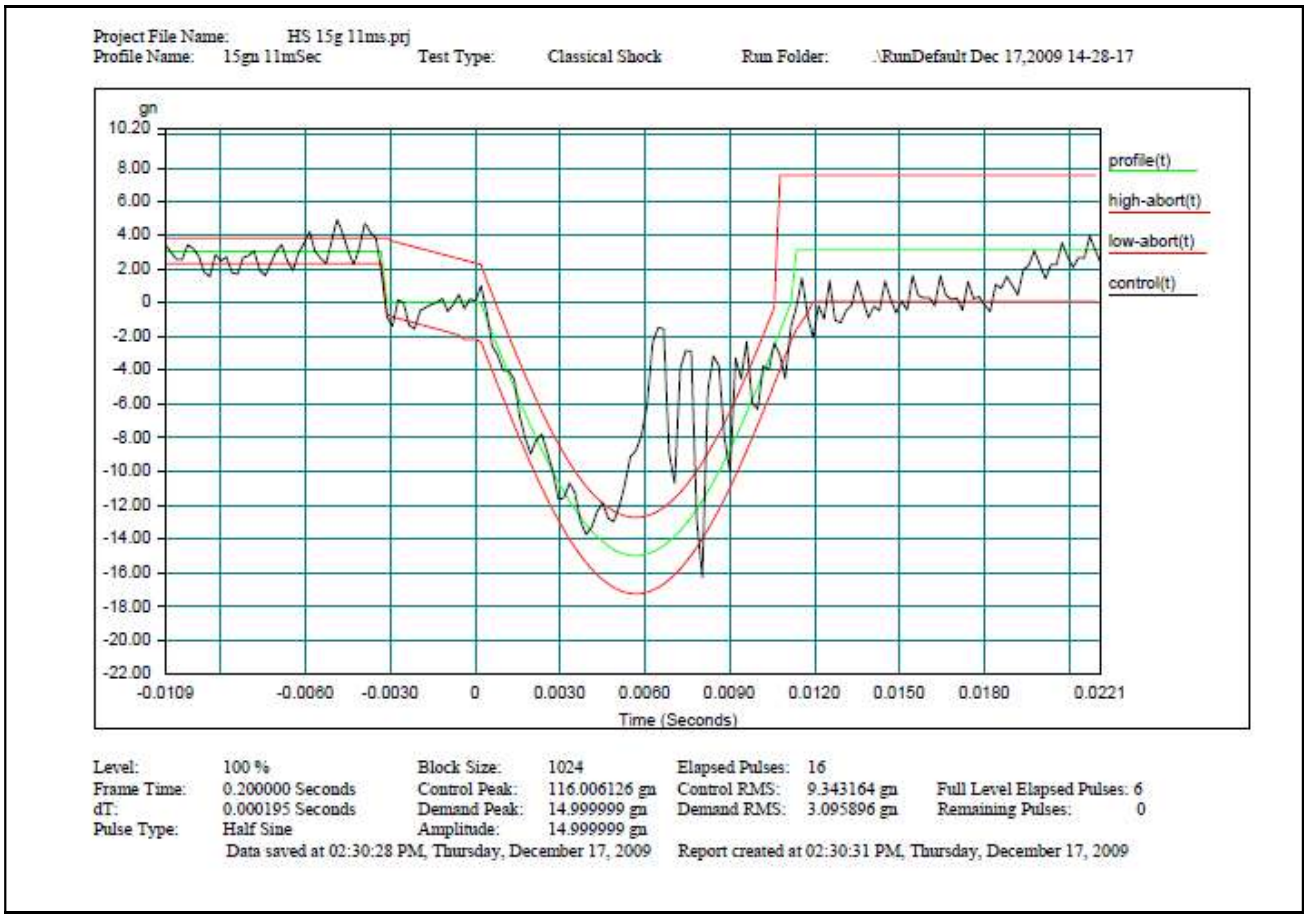
Plot 28. Test No. 32: Mechanical Shock, Negative Shock, Y-Axis, Control



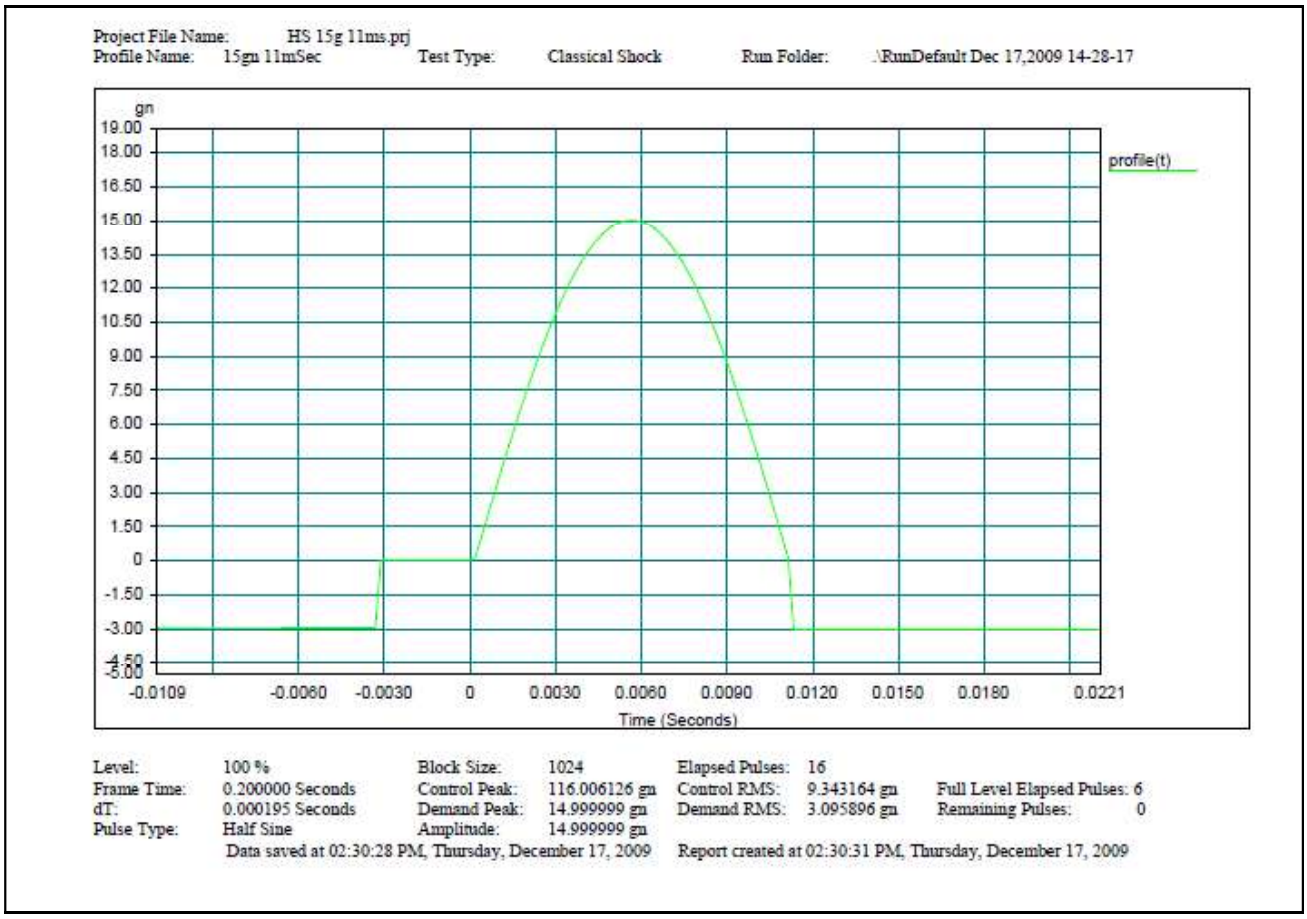
Plot 29. Test No. 32: Mechanical Shock, Positive Shock, Y-Axis, Monitor – 1



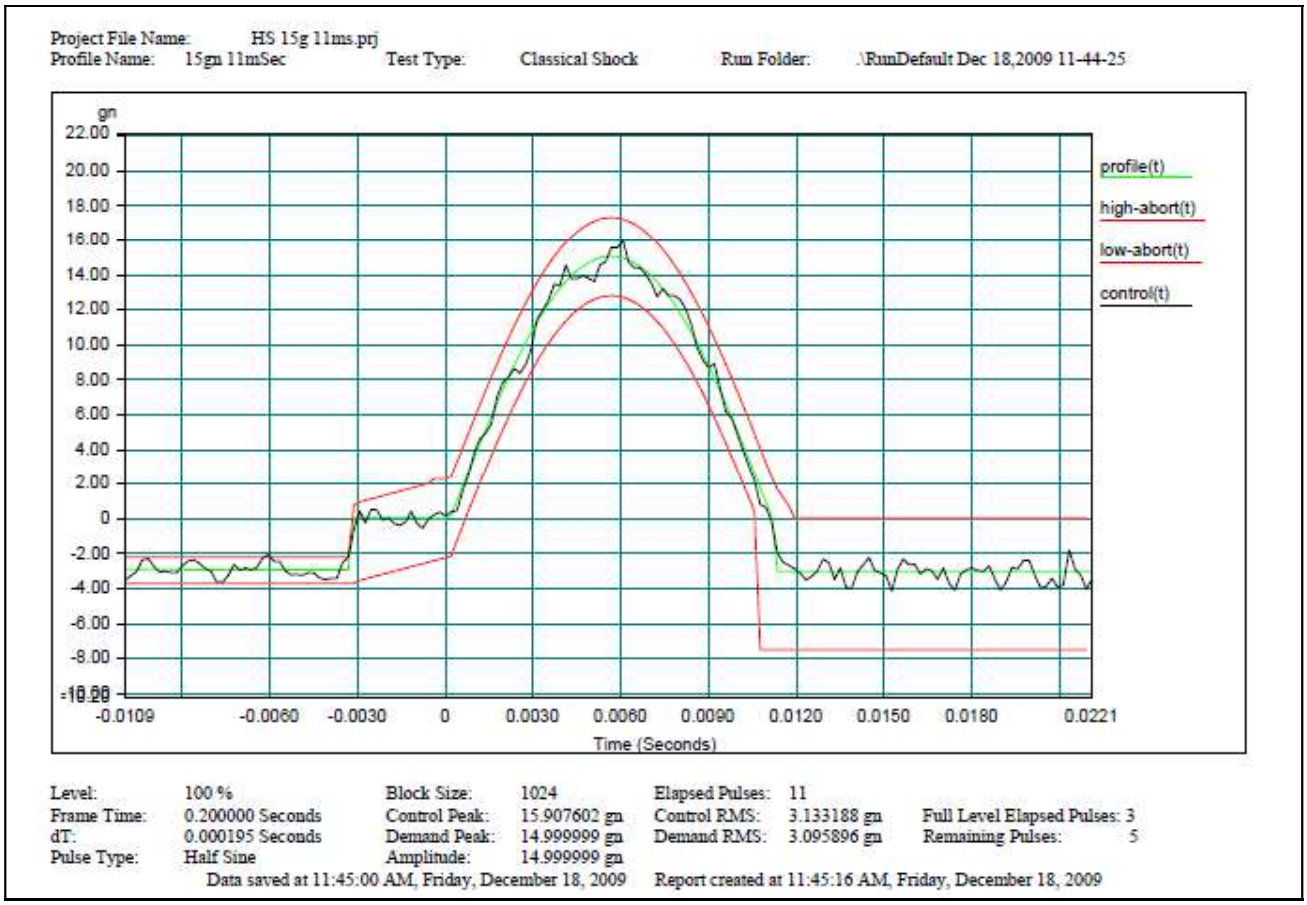
Plot 30. Test No. 32: Mechanical Shock, Positive Shock, Y-Axis, Monitor – 2



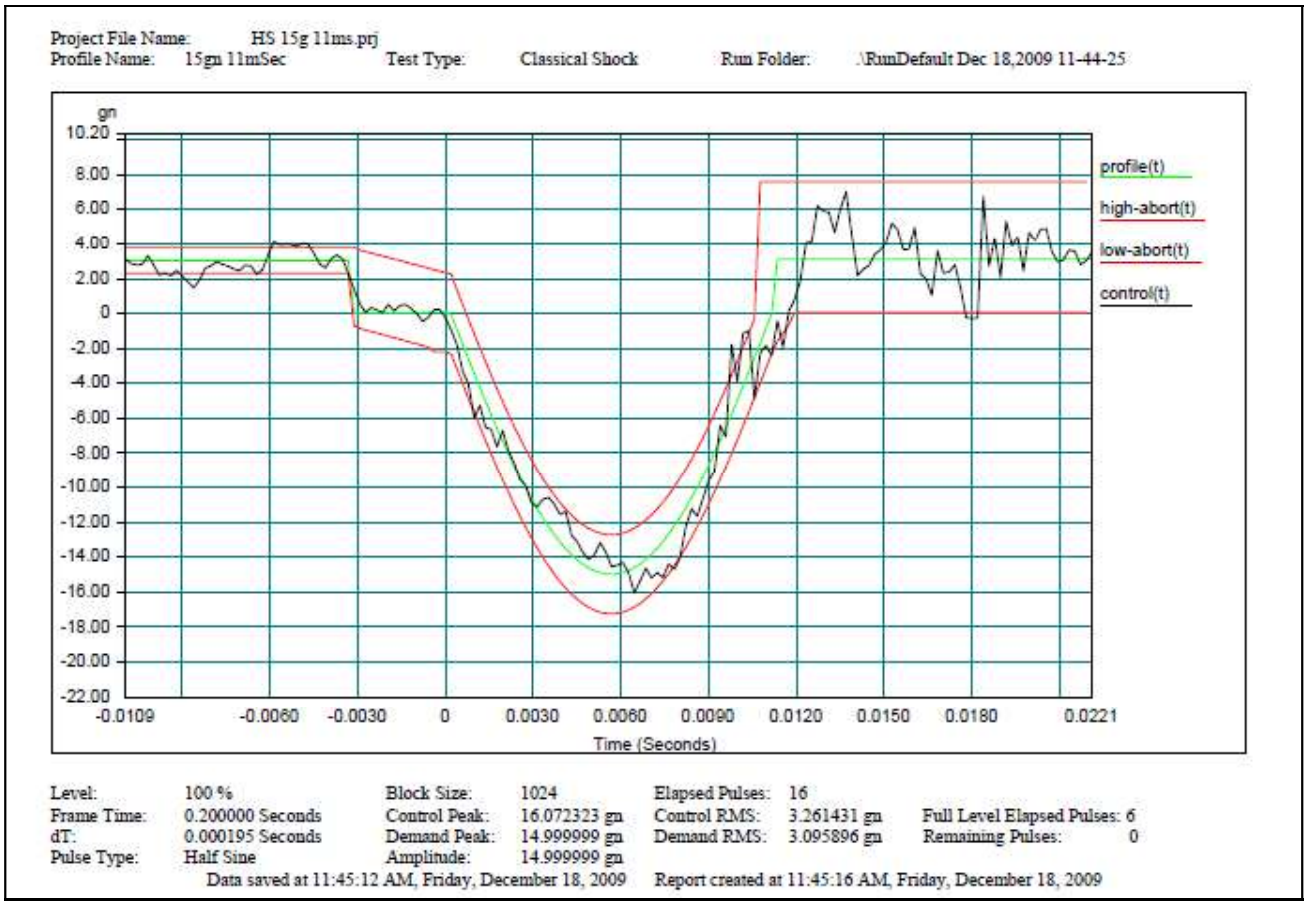
Plot 31. Test No. 32: Mechanical Shock, Negative Shock, Y-Axis, Control – 2



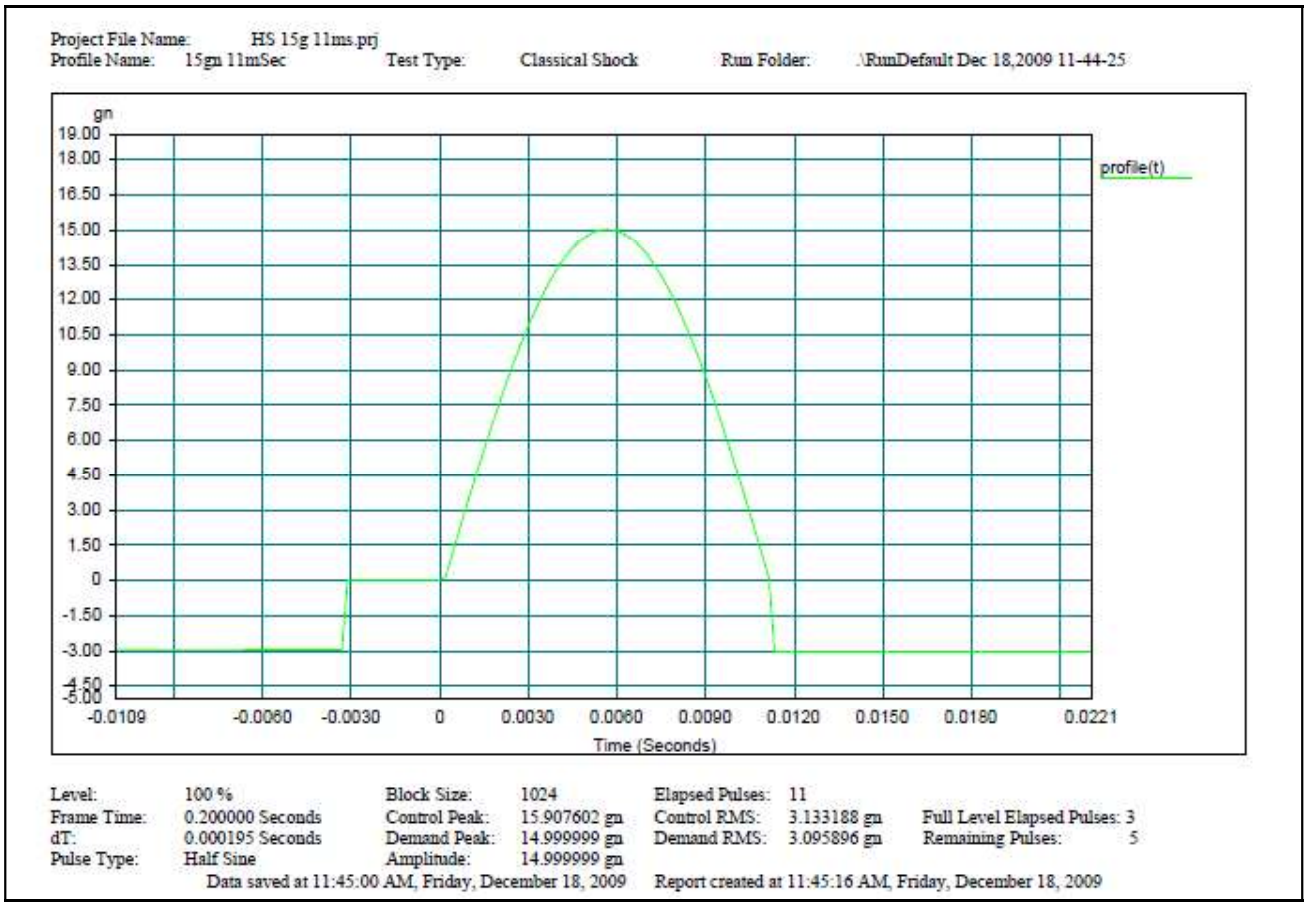
Plot 32. Test No. 32: Mechanical Shock, Positive Shock, Y-Axis, Monitor – 3



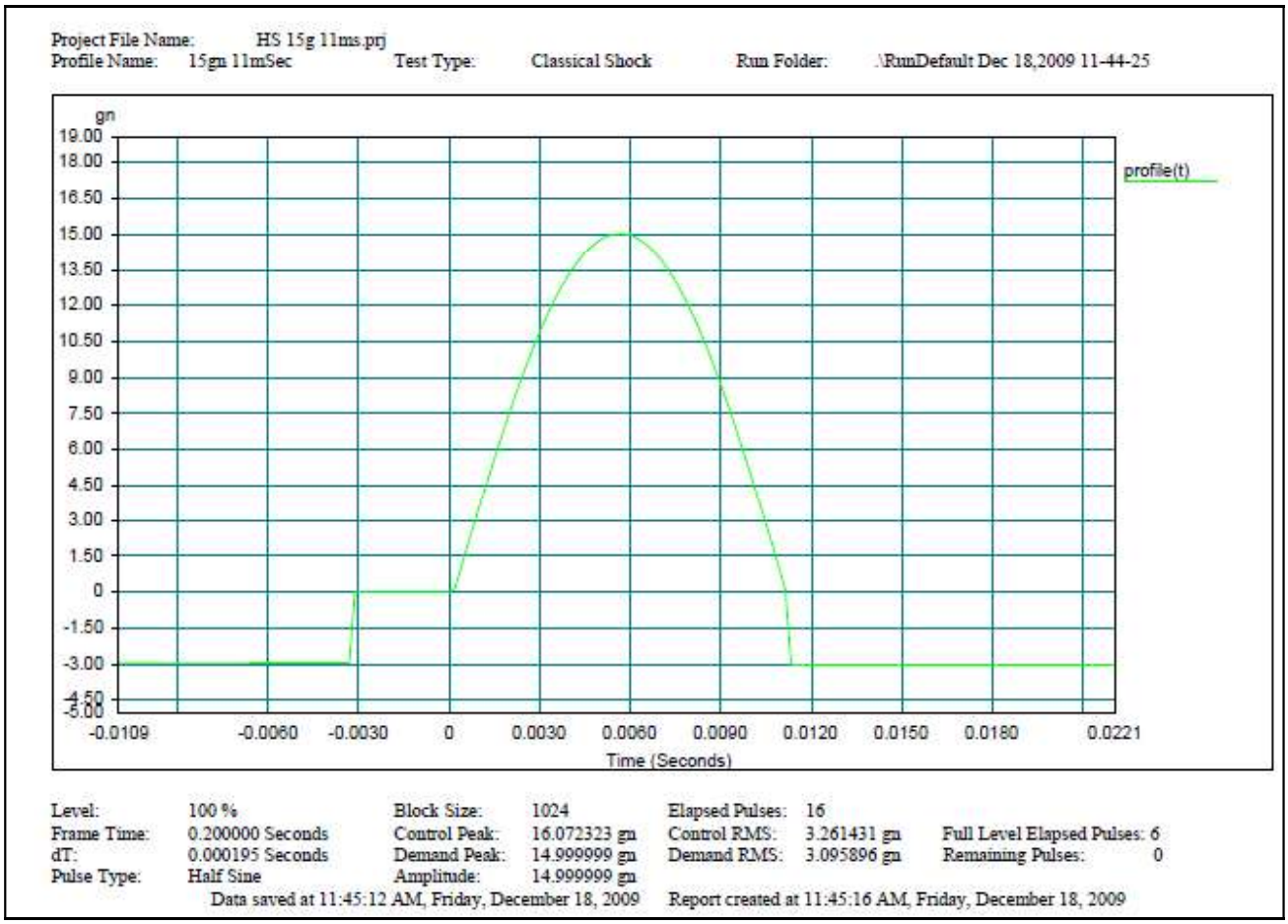
Plot 33. Test No. 32: Mechanical Shock, Positive Shock, Z-Axis, Control



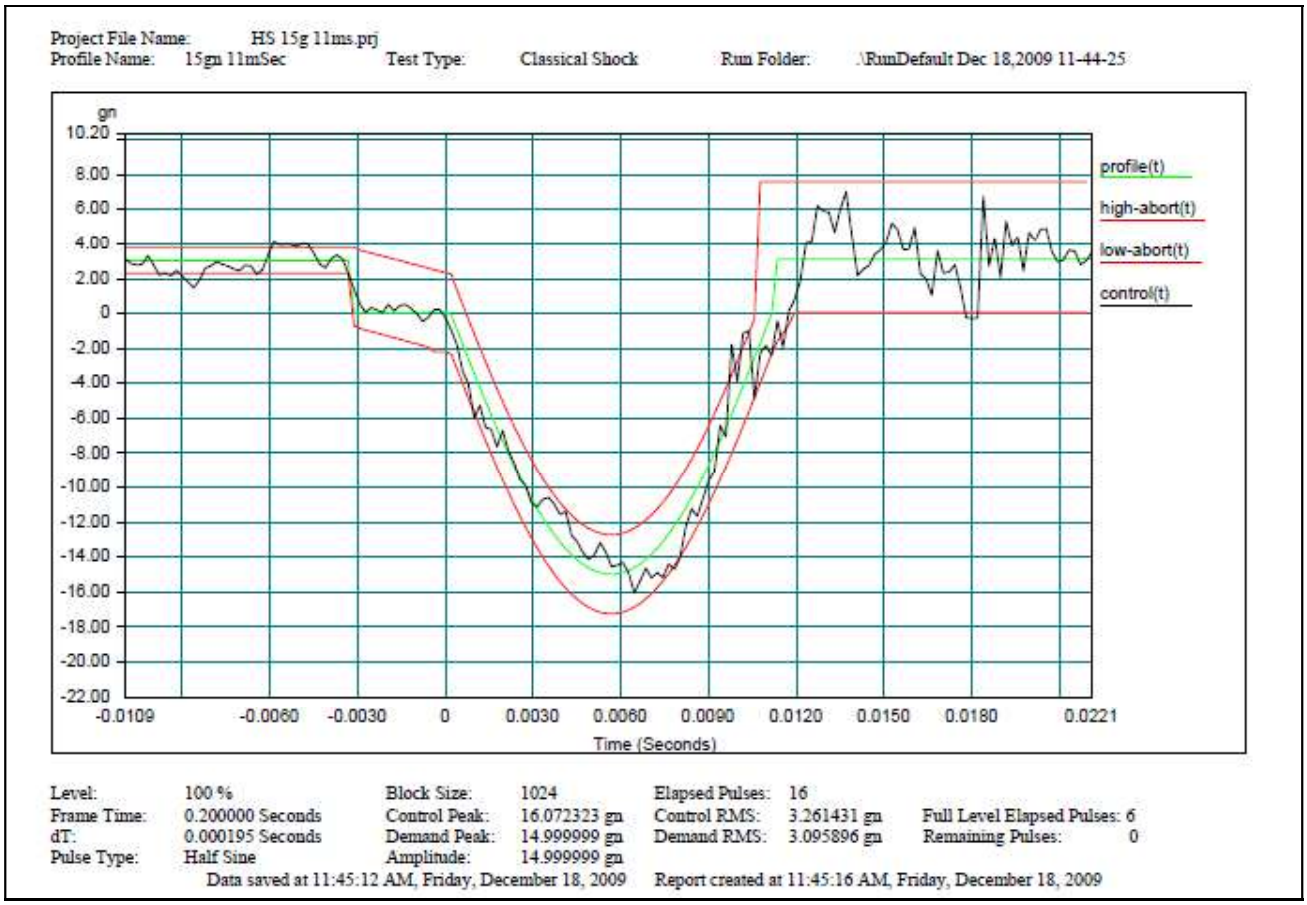
Plot 34. Test No. 32: Mechanical Shock, Negative Shock, Z-Axis, Control



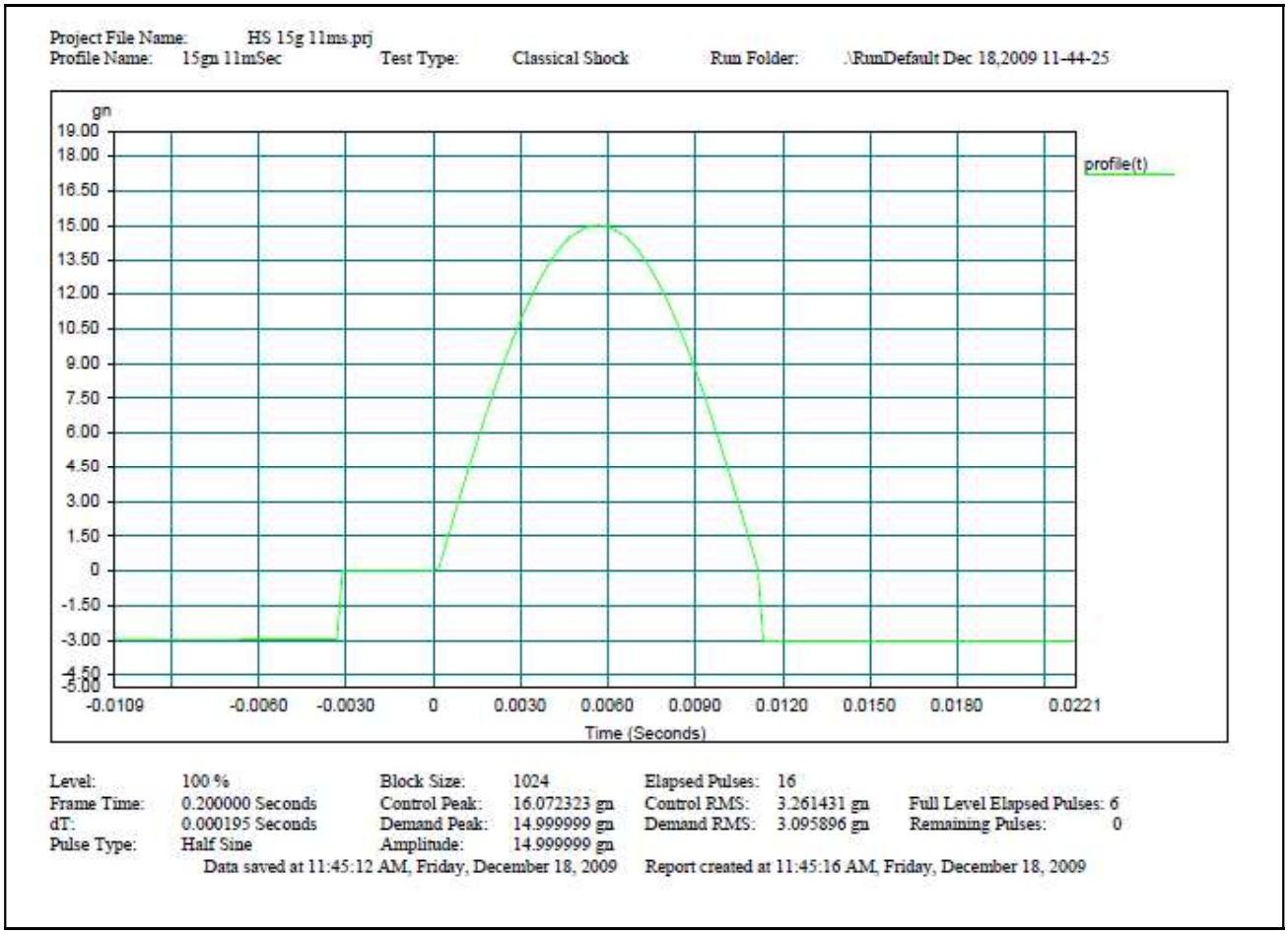
Plot 35. Test No. 32: Mechanical Shock, Positive Shock, Z-Axis, Monitor – 1



Plot 36. Test No. 32: Mechanical Shock, Positive Shock, Z-Axis, Monitor – 2



Plot 37. Test No. 32: Mechanical Shock, Negative Shock, Z-Axis, Control – 2



Plot 38. Test No. 32: Mechanical Shock, Positive Shock, Z-Axis, Monitor – 3

Photograph 39. Test No. 32: Mechanical Shock, X-Axis, Test Setup – 1

Photograph 40. Test No. 32: Mechanical Shock, X-Axis, Test Setup – 2

Photograph 41. Test No. 32: Mechanical Shock, Y-Axis, Test Setup - 1

Photograph 42. Test No. 32: Mechanical Shock, Y-Axis, Test Setup - 2

4.1 Test No. 33: Transportation Drop

Test Requirement(s): **4.7.3.19 of ANSI C12.1-2001:** This test shall be conducted as described as Shock Testing in the International Safe Transit Association Test Procedure 1A, Performance Test for Individual Packaged-Products Weighing 150 lb. (68 kg) or Less. (revision date: July 2000). The metering device shall be in its intended final packaging. The metering device shall be exposed to ten drops to a hard floor in accordance with the above referenced ISTA standard.

Test Results: The EUT was compliant with the requirement(s) of this section.

Test Engineer(s): William Murphy

Test Date(s): 01/27/10 and 01/28/10

Customer: Wasion
Test: Test 33 Transportation Drop
Model: Libra
Job: 27839

	FM	Serial	Class	Visible Damage	Still Operate
1	2S	x296	CL200	No	Yes
2	2S	x297	CL200	No	Yes
3	2S	x298	CL200	No	Yes

weight: 9 lbs
Drop Height: 30 in

Table 118. Test No. 33: Transportation Drop, Test Results

Serial: x296
Class: 200
FM: 2S

Before Transportation Vibration					
Configuration:					
volt	**amp**	**phase_angle**	**freq**	**% reg**	**% error**
240V	30	0	60	100.017	0.017
240V	3	0	60	100.043	0.043
240V	30	300	60	100.055	0.055
After Transportation Drop					
Configuration:					
volt	**amp**	**phase_angle**	**freq**	**% reg**	**% error**
240V	30	0	60		-100
240V	3	0	60		-100
240V	30	300	60		-100

Table 119. Test No. 33: Transportation Drop, Test Results, Performance Verification, Meter Serial No. 10296

Serial: x297 Class: 200 FM: 2S					
Before Transportation Vibration					
Configuration:					
volt	**amp**	**phase_angle**	**freq**	**% reg**	**% error**
240V	30	0	60	100.013	0.013
240V	3	0	60	100.029	0.029
240V	30	300	60	100.085	0.085
After Transportation Drop					
Configuration:					
volt	**amp**	**phase_angle**	**freq**	**% reg**	**% error**
240V	30	0	60		-100
240V	3	0	60		-100
240V	30	300	60		-100

Table 120. Test No. 33: Transportation Drop, Test Results, Performance Verification, Meter Serial No. 10297

Serial: x298 Class: 200 FM: 2S					
Before Transportation Vibration					
Configuration:					
volt	**amp**	**phase_angle**	**freq**	**% reg**	**% error**
240V	30	0	60	100.011	0.011
240V	3	0	60	100.026	0.026
240V	30	300	60	100.024	0.024
After Transportation Drop					
Configuration:					
volt	**amp**	**phase_angle**	**freq**	**% reg**	**% error**
240V	30	0	60		-100
240V	3	0	60		-100
240V	30	300	60		-100

Table 121. Test No. 33: Transportation Drop, Test Results, Performance Verification, Meter Serial No. 10298

Photograph 43. Test No. 33: Transportation Drop, Setup

Photograph 44. Test No. 33: Transportation Drop, Before

Photograph 29. Test No. 33: Transportation Drop, 30 Inches Drop

Photograph 45. Test No. 33: Transportation Drop, After

Test No. 34: Vibration

Test Requirement(s): **4.7.3.20 of ANSI C12.1-2001**: This test shall be conducted as described in lEG 60068 PT 2-6 revision 1982 based on the following conditions:
-The metering device shall not be operating and shall be without packaging
-The metering device shall be rigidly mounted to a test fixture and the reference point for the control accelerometer shall be attached to the test fixture.
-The test shall be run over a frequency range of 30 to 350 Hz, with a sweep time of one octave per minute at 5 m/s2 (0.5 g) along each of three mutually perpendicular axes.
-The sweep duration shall be 30 minutes along each axis.

Test Results: The EUT was compliant with the requirement(s) of this section.

Test Engineer(s): William Murphy

Test Date(s): 10/14/09 to 12/18/09

Test: Performance Verification
Customer: Waison
Model: Libra
S/N: 20081165010271
Meter Form: 2S
Meter Class: 200
Voltage: 240V
Job Number: 27839

volt	amp	phase_angle	freq	% reg
240V	30	0	60	99.9334
240V	3	0	60	99.9907
240V	30	300	60	99.9897

Table 122. Test No. 34: Vibration, Performance Verification, Meter Serial No. 20081165010271, Pre-Test

Test: Performance Verification
Customer: Waison
Model: Libra
S/N: 20081165010271
Meter Form: 2S
Meter Class: 200
Voltage: 240V
Job Number: 27839

volt	amp	phase_angle	freq	% reg
240V	30	0	60	99.9645
240V	3	0	60	100.013
240V	30	300	60	100.018

Table 123. Test No. 34: Vibration, Performance Verification, Meter Serial No. 20081165010271, Post Test

Test: Performance Verification
Customer: Waison
Model: Libra
S/N: 20081165010279
Meter Form: 2S
Meter Class: 200
Voltage: 240V
Job Number: 27839

volt	amp	phase_angle	freq	% reg
240V	30	0	60	100.0746
240V	3	0	60	100.0981
240V	30	300	60	100.1232

Table 124. Test No. 34: Vibration, Performance Verification, Meter Serial No. 20081165010279, Pre-Test

Test: Performance Verification
Customer: Waison
Model: Libra
S/N: 20081165010279
Meter Form: 2S
Meter Class: 200
Voltage: 240V
Job Number: 27839

volt	amp	phase_angle	freq	% reg
240V	30	0	60	100.0966
240V	3	0	60	100.0984
240V	30	300	60	100.1440

Table 125. Test No. 34: Vibration, Performance Verification, Meter Serial No. 20081165010279, Post Test

Test: Performance Verification
Customer: Waison
Model: Libra
S/N: 20081165010280
Meter Form: 2S
Meter Class: 200
Voltage: 240V
Job Number: 27839

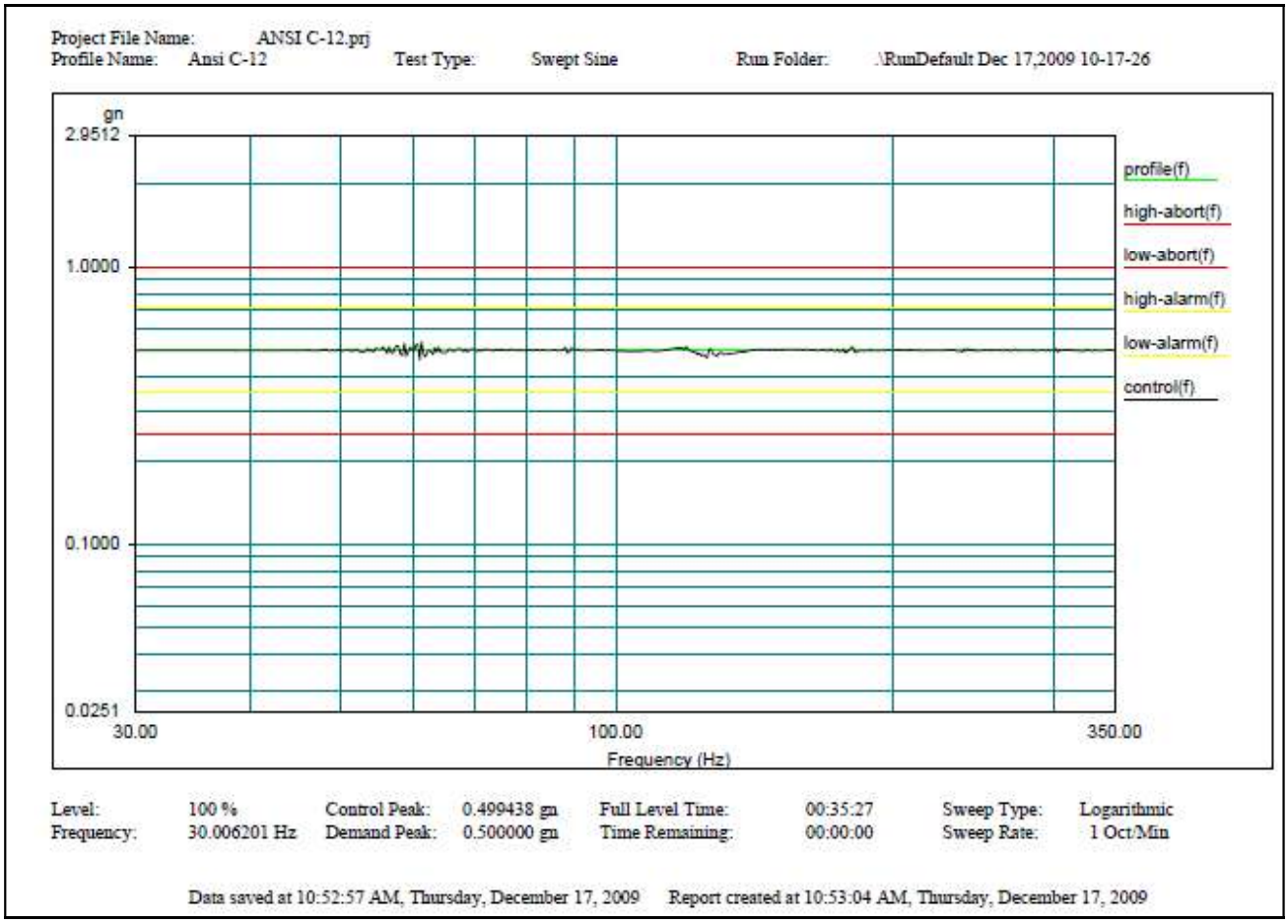
volt	amp	phase_angle	freq	% reg
240V	30	0	60	99.994
240V	3	0	60	100.0497
240V	30	300	60	100.0757

Table 126. Test No. 34: Vibration, Performance Verification, Meter Serial No. 20081165010280, Pre-Test

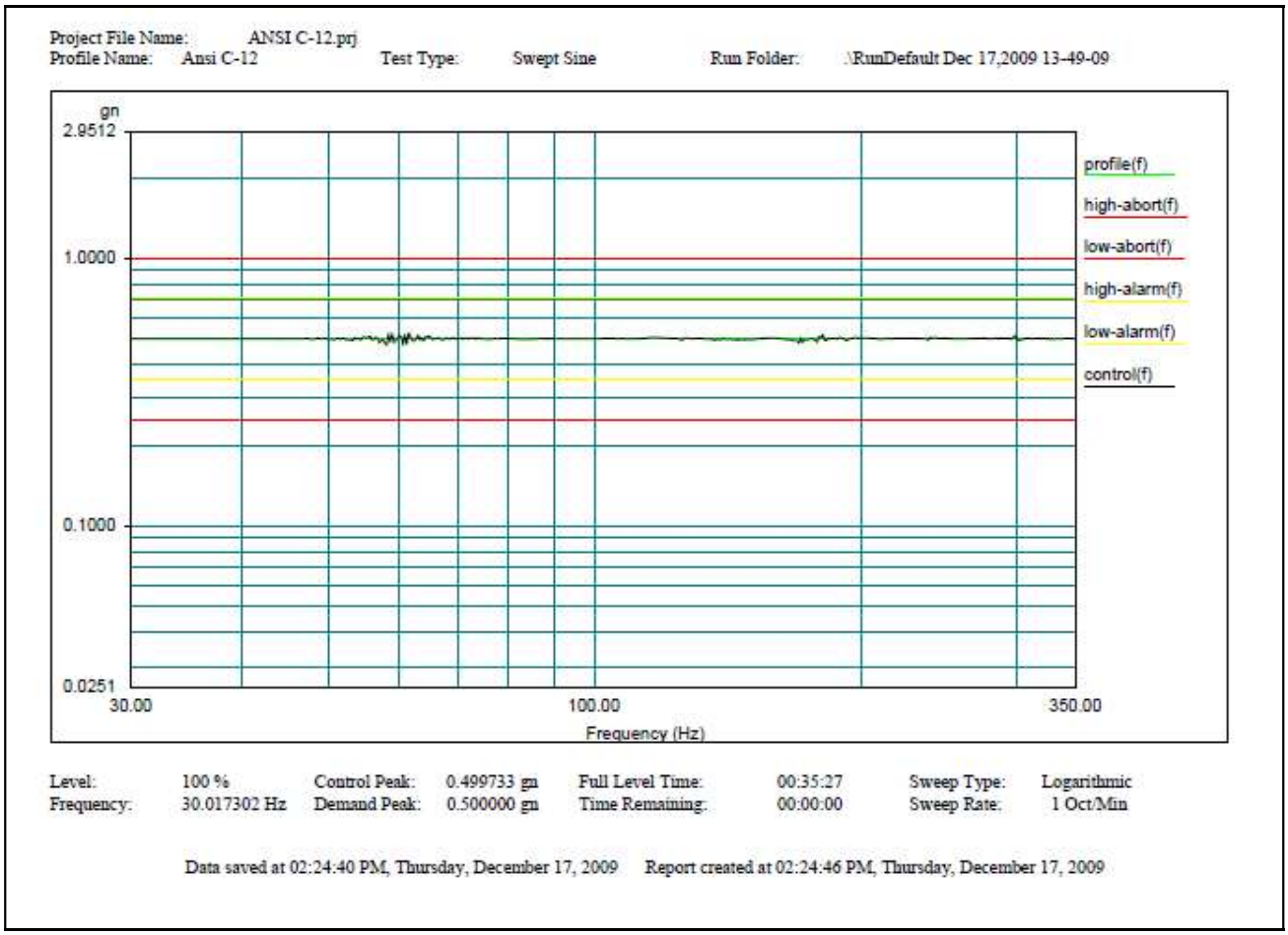
Test: Performance Verification
Customer: Waison
Model: Libra
S/N: 20081165010280
Meter Form: 2S
Meter Class: 200
Voltage: 240V
Job Number: 27839

volt	amp	phase_angle	freq	% reg
240V	30	0	60	100.0175
240V	3	0	60	100.0515
240V	30	300	60	100.0806

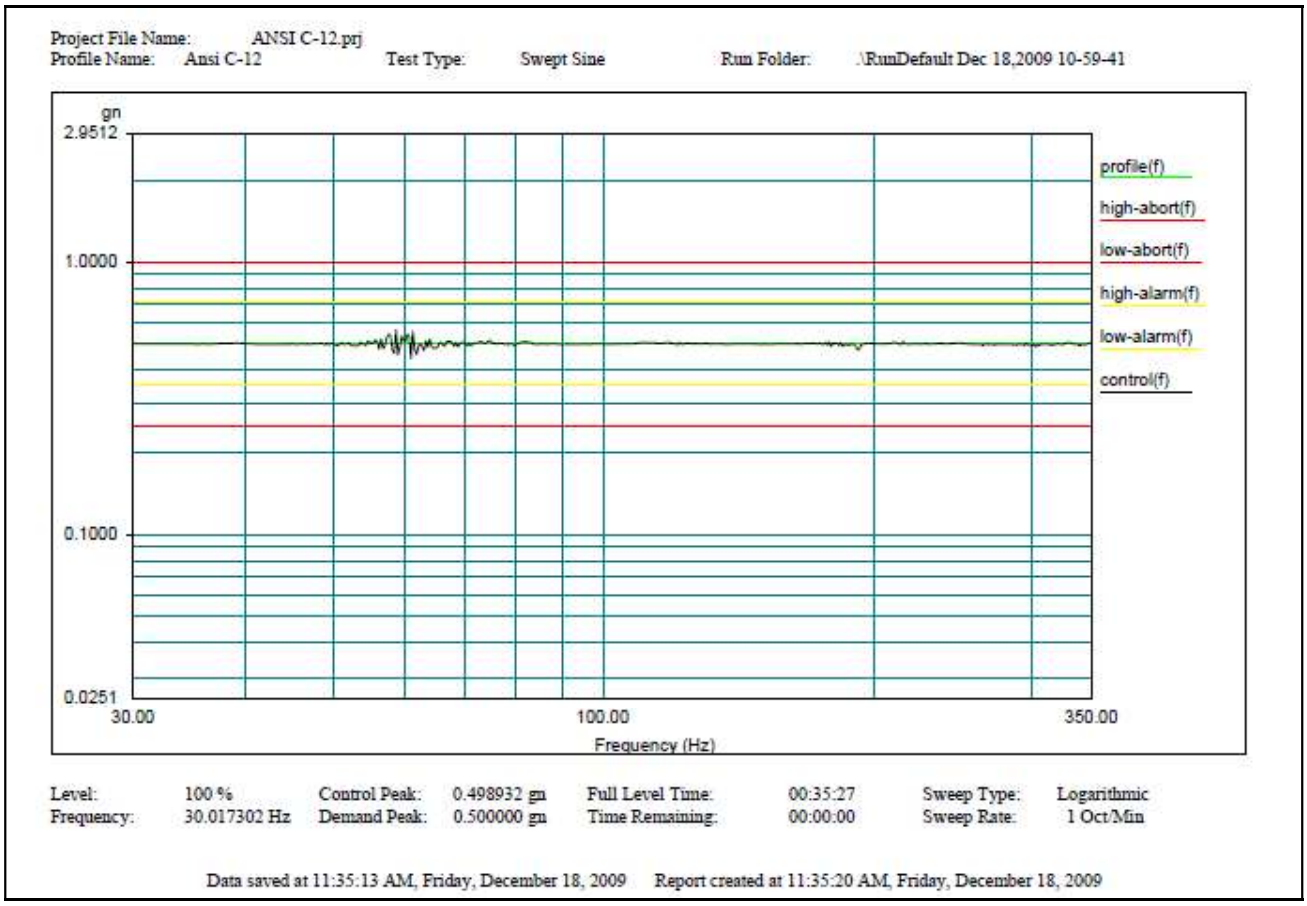
Table 127. Test No. 34: Vibration, Performance Verification, Meter Serial No. 20081165010280, Post Test



Plot 39. Test No. 34: Vibration, X-Axis, Control

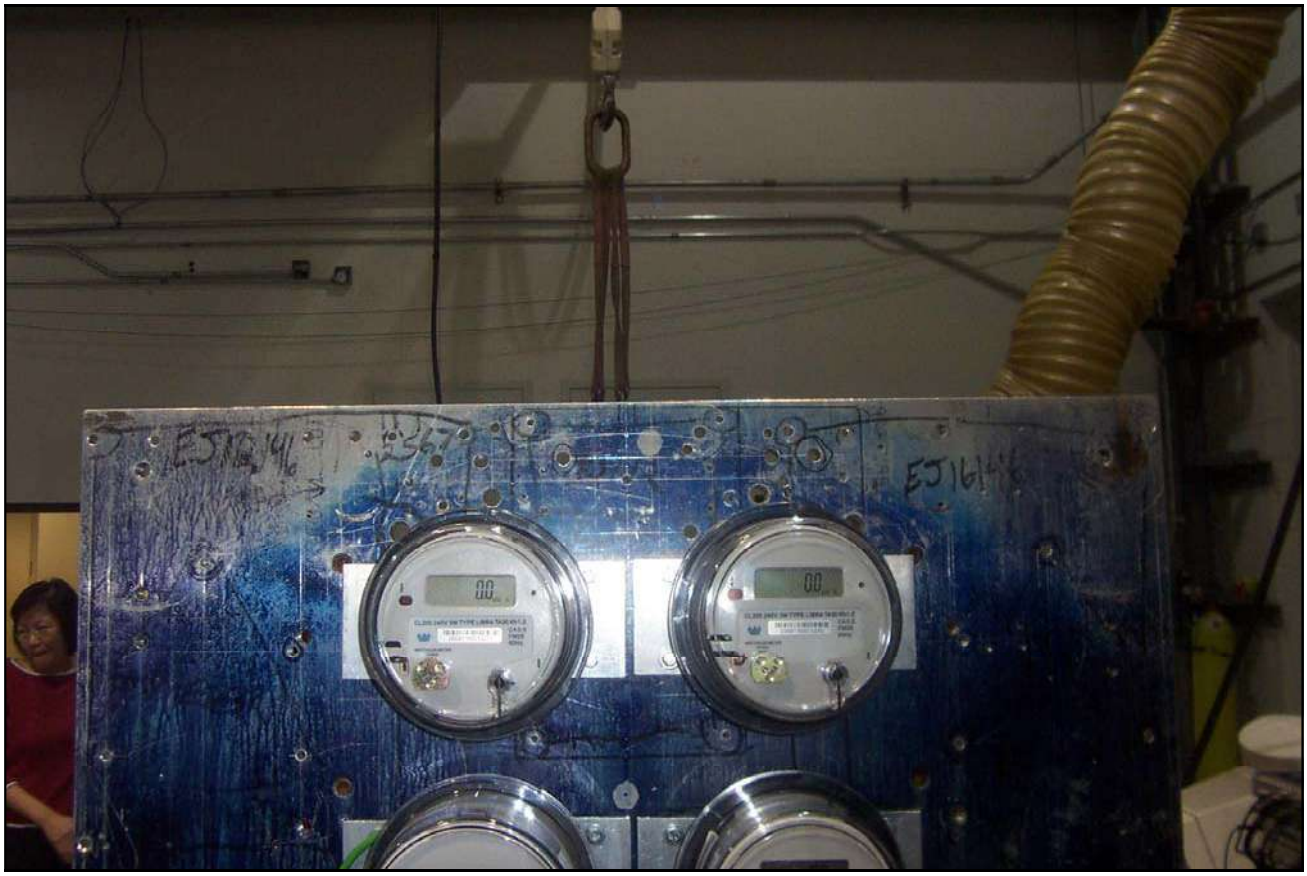


Plot 40. Test No. 34: Vibration, Y-Axis, Control



Plot 41. Test No. 34: Vibration, Z-Axis, Control

Photograph 46. Test No. 34: Vibration, Performance Verification, Test Setup

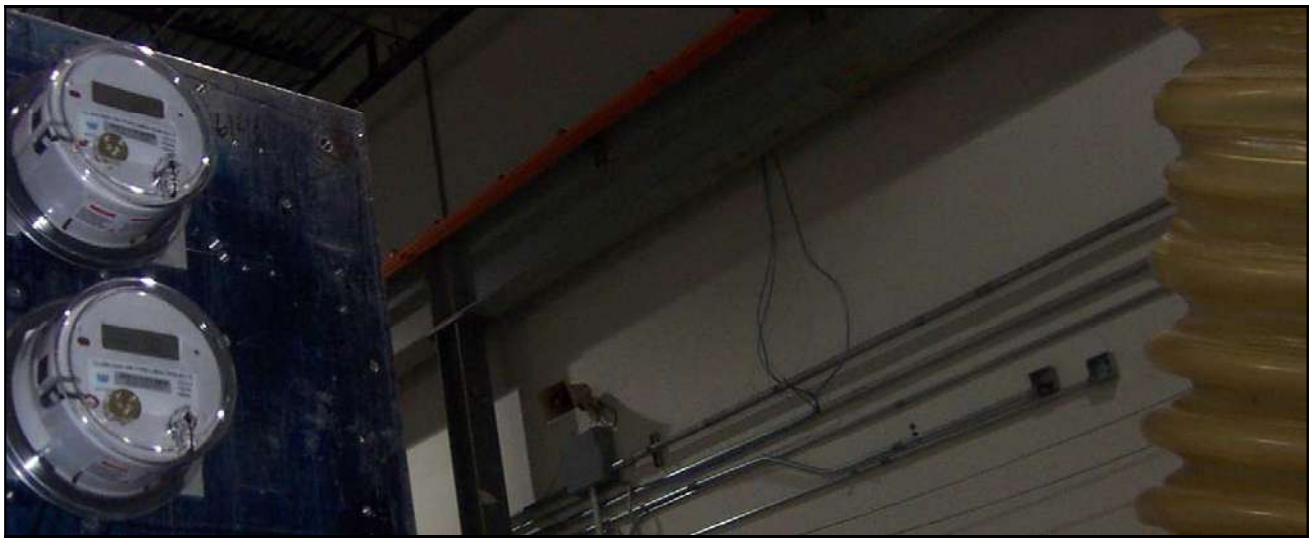


Photograph 47. Test No. 34: Vibration, X-Axis, Test Setup – 1

Photograph 48. Test No. 34: Vibration, X-Axis, Test Setup – 2

Photograph 49. Test No. 34: Vibration, Y-Axis, Test Setup – 1

Photograph 50. Test No. 34: Vibration, Y-Axis, Test Setup – 2



Photograph 51. Test No. 34: Vibration, Z-Axis, Test Setup – 1

Photograph 52. Test No. 34: Vibration, Z-Axis, Test Setup – 2

Test No. 35: Transportation Vibration

Test Requirement(s): **4.7.3.21 of ANSI C12.1-2001:** The metering device, packaged in its intended packing container shall pass the requirements described as Vibration Testing in the International Safe Transit Association Test Procedure 1A, Performance Test for Individual Packaged-Products Weighing 150 lb. (68 kg) or Less. (revision date: July 2000). This test must be done on the same metering devices and the same packaging as test number 33, and must be done before test number 33. This test exposes the metering device, packaged for shipment, to transportation, for approximately one hour.

Test Results: The EUT was compliant with the requirement(s) of this section.

Test Engineer(s): William Murphy

Test Date(s): 10/14/09 to 01/04/10

Customer: Wasion
Test: Test 35 Transportation Vibration
Job: 27839

	FM	Serial	Class	Visible Damage	Still Operate
1	2S	x279	CL200	No	Yes
2	2S	x280	CL200	No	Yes
3	2S	x271	CL200	No	Yes

freq: 28 Hz
Test Time: 47 min
weight: 9 lbs

Table 128. Test No. 35: Transportation Vibration, Test Results

Photograph 53. Test No. 35: Transportation Vibration, Test Set-up

Photograph 54. Test No. 35: Transportation Vibration, Before

Photograph 55. Test No. 35: Transportation Vibration, After

Test No. 36: Weather Simulation Test

Test Requirement(s): **4.7.3.22 of ANSI C12.1-2001:** This test is intended for devices used in outdoor applications. The metering device shall be in a normal operating condition (cover on, etc.); but not powered. The metering device shall be mounted in the normal operating orientation in the weathering apparatus with the side normally exposed to the weather facing the test chamber light source and water spray. Meters shall be tested in a suitable mounting device with the conduit holes sealed against moisture. Metering devices shall then be subjected to a series of 2-hour weathering cycles for a total of 14 days in accordance with Exposure Condition 1 of Table X3.1 of the 1998 edition of ASTM G155:

-Each 2-hour cycle shall consist of 102 minutes of light exposure followed by 18 minutes of both light and water spray.
-The light source shall be a xenon-arc lamp utilizing borosilicate glass inner and outer optical filters to simulate the spectral power distribution of natural daylight. The irradiance measured at 340 nm shall be maintained at 0.35 W/m2 throughout the test. During the light-only portion of the cycle, the black panel temperature shall be maintained at 63°C.
-The water spray shall be applied to the metering devices under test using spray nozzles adjusted so that water is sprayed onto the surfaces of the test samples that are normally exposed to the weather.

After this test, covers, terminal covers, etc. shall be readily removable. There shall be no progressive corrosion or electrolytic action that will adversely affect the functioning of any part of the meter. Also, there shall be no evidence of deleterious discoloration or fading of finishes or materials.

Test Results: The EUT was compliant with the requirement(s) of this section.

Test Engineer(s): William Murphy

Test Date(s): 10/14/09 to 02/18/10

Test: 36 Weather Simulation Customer: Wasion Model: Libra Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839		
1	Serial Number:	x296
	Voltage:	240V
	Class:	200
	FM:	2S
	Operate Continuously:	N/A
	Any Visible Damage?	No
2	Serial Number:	x297
	Voltage:	240V
	Class:	200
	FM:	2S
	Operate Continuously:	N/A
	Any Visible Damage?	No
3	Serial Number:	x298
	Voltage:	240V
	Class:	200
	FM:	2S
	Operate Continuously:	N/A
	Any Visible Damage?	No

Table 129. Test No. 36: Weather Simulation, Test Results

Photograph 56. Test No. 36: Weather Simulation, View of Inside Chamber

Photograph 57. Test No. 36: Weather Simulation, View of Outside Chamber

Photograph 58. Test No. 36: Weather Simulation, Meter Serial No. 10296

Photograph 59. Test No. 36: Weather Simulation, Meter Serial No. 10297

Photograph 60. Test No. 36: Weather Simulation, Meter Serial No. 10298

Test No. 37: Salt-Spray Test

Test Requirement(s): **4.7.3.23 of ANSI C12.1-2001:** This test is intended for devices used in outdoor applications. The metering device shall be mounted in its normal operating position in a salt-spray chamber and subjected to a 25 hour salt-spray test in accordance with the current edition of ASTM B 117. The metering device shall be tested with a suitable mounting device with the conduit holes sealed against moisture. After this test, covers, terminal covers, etc., shall be readily removable. There shall be no progressive corrosion or electrolytic action that will adversely affect the functioning of any part of the apparatus.

Test Results: The EUT was compliant with the requirement(s) of this section.

Test Engineer(s): William Murphy

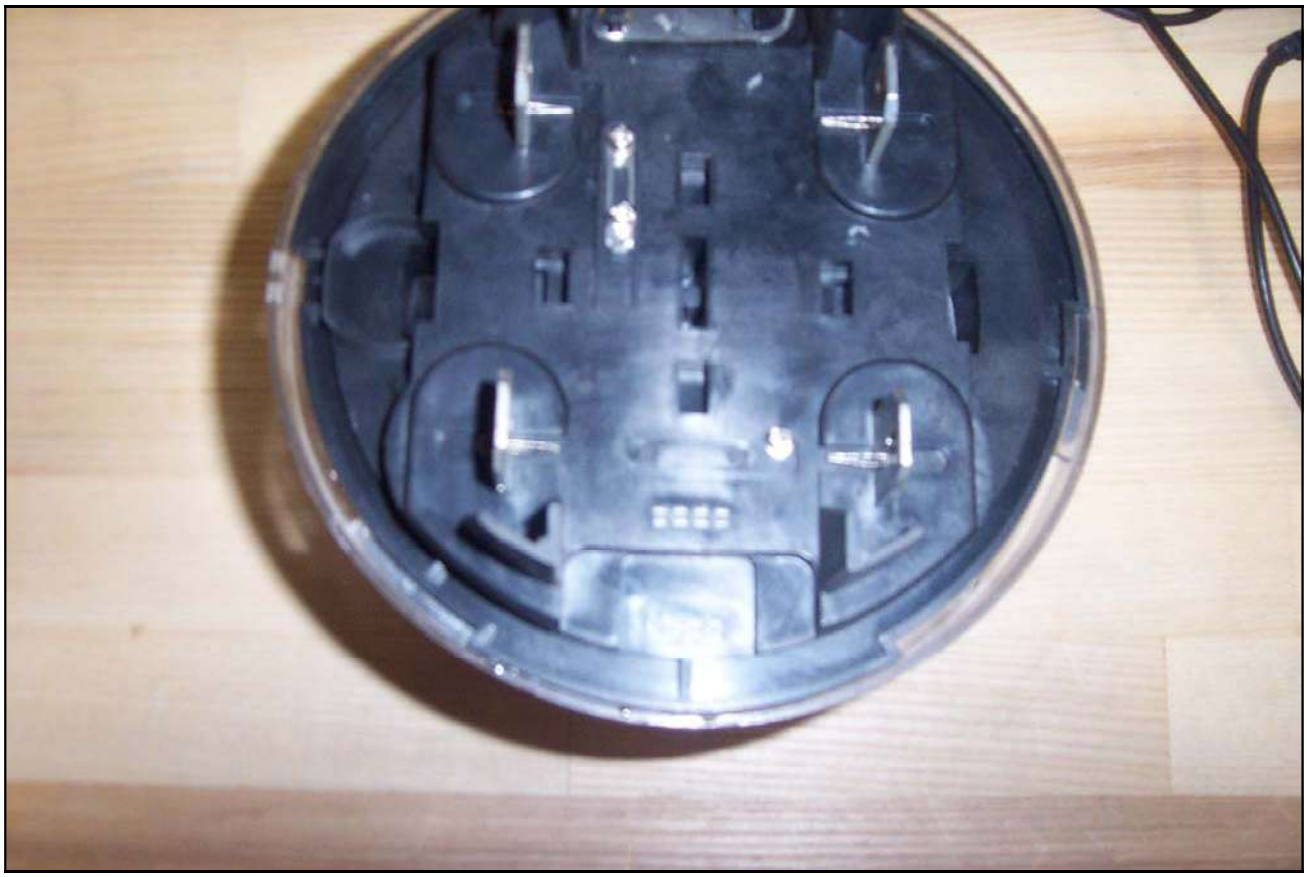
Test Date(s): 10/14/09 to 03/05/10

Test: 37 Salt Spray Customer: Wasion Model: Libra Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839		
1	Serial Number:	x296
	Voltage:	240V
	Class:	200
	FM:	2S
	Operate Continuously:	N/A
	Any Visible Damage?	No
2	Serial Number:	x297
	Voltage:	240V
	Class:	200
	FM:	2S
	Operate Continuously:	N/A
	Any Visible Damage?	No
3	Serial Number:	x298
	Voltage:	240V
	Class:	200
	FM:	2S
	Operate Continuously:	N/A
	Any Visible Damage?	No

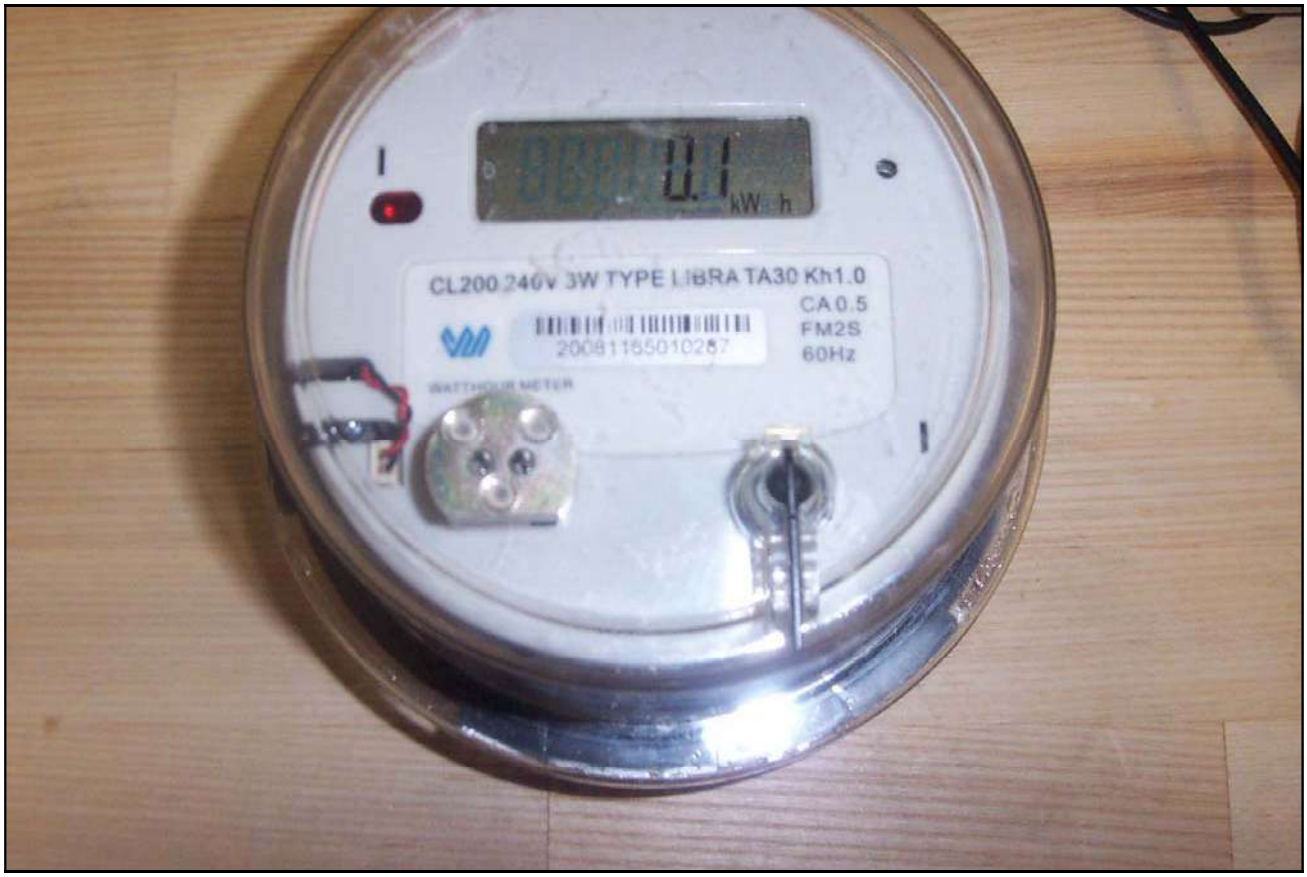
Table 130. Test No. 37: Salt Spray, Test Results

Photograph 61. Test No. 37: Salt Spray, Test Set-up

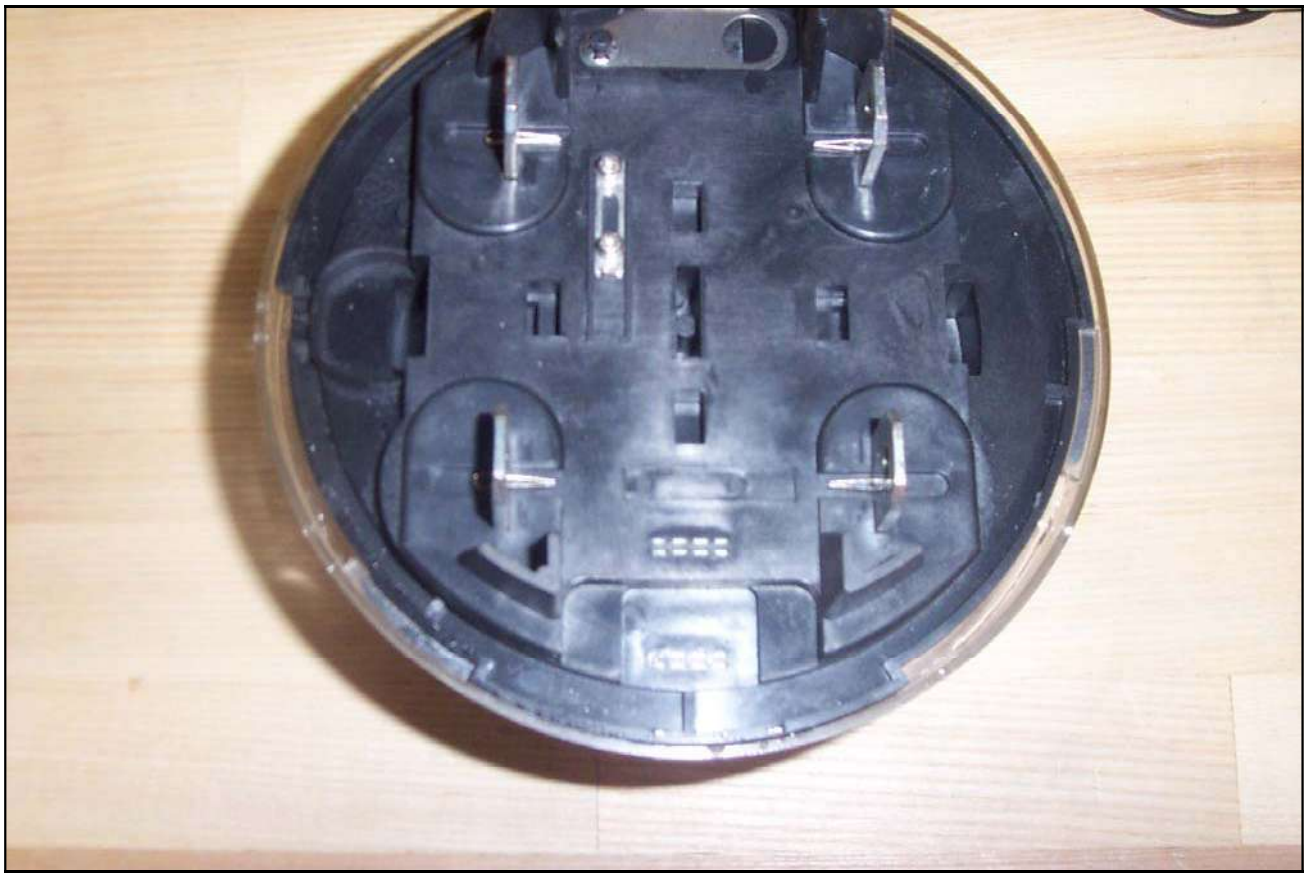
Photograph 62. Test No. 37: Salt Spray, Meter Serial No. 10296, Front View



Photograph 63. Test No. 37: Salt Spray, Meter Serial No. 10296, Rear View

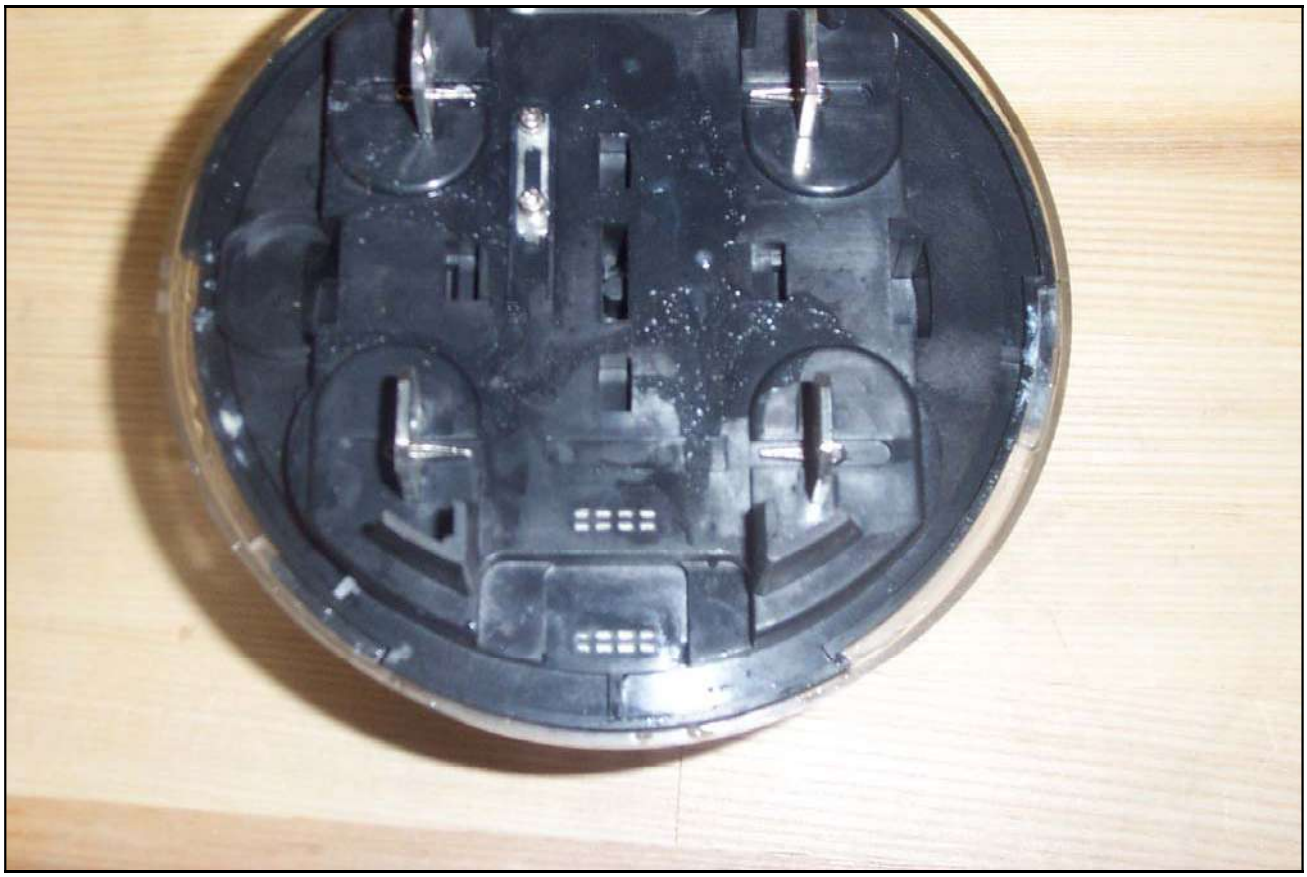


Photograph 64. Test No. 37: Salt Spray, Meter Serial No. 10297, Front View



Photograph 65. Test No. 37: Salt Spray, Meter Serial No. 10297, Rear View

Photograph 66. Test No. 37: Salt Spray, Meter Serial No. 10298, Front View



Photograph 67. Test No. 37: Salt Spray, Meter Serial No. 10298, Rear View

Test No. 38: Rain-tightness

Test Requirement(s): **4.7.3.24 of ANSI C12.1-2001:** When mounted in its normal operating position in or on a meter mounting intended for outdoor installation, a metering device shall pass the test described in UL 50.

Test Results: The EUT was compliant with the requirement(s) of this section.

Test Engineer(s): William Murphy

Test Date(s): 10/14/09 to 03/05/10

Test: 38 Rain-Tightness Customer: Wasion Model: Libra Meter Form: 2S Meter Class: 200 Voltage: 240V Job Number: 27839		
1	Serial Number:	x296
	Voltage:	240V
	Class:	200
	FM:	2S
	Operate Continuously:	N/A
	Rain Intrusion?	Yes
2	Serial Number:	x297
	Voltage:	240V
	Class:	200
	FM:	2S
	Operate Continuously:	N/A
	Rain Intrusion?	Yes
3	Serial Number:	x298
	Voltage:	240V
	Class:	200
	FM:	2S
	Operate Continuously:	N/A
	Rain Intrusion?	Yes

Table 131. Test No. 38: Rain-Tightness, Test Results

Photograph 68. Test No. 38: Rain-Tightness, Test Set-up

Photograph 69. Test No. 38: Rain-Tightness, Meter Serial No. 10296, After – 1

Photograph 70. Test No. 38: Rain-Tightness, Meter Serial No. 10296, After – 2

Photograph 71. Test No. 38: Rain-Tightness, Meter Serial No. 10297, After – 1

Photograph 72. Test No. 38: Rain-Tightness, Meter Serial No. 10297, After – 2

Photograph 73. Test No. 38: Rain-Tightness, Meter Serial No. 10298, After – 1

Photograph 74. Test No. 38: Rain-Tightness, Meter Serial No. 10298, After – 2

5.0 Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ANSI/NCSL Z540-1-1994 and ANSI/ISO/IEC 17025:2000.

Test No. 1: No Load				**Test Date(s):** 10/12/09 to 10/13/09	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
4T7310	TIMER	CONTROL COMPANY	5007	11/26/2008	11/26/2010
4T7283	AUTOMATED METER TESTING SYSTEM	WECO	2300	SEE NOTE	
4T7288	METERING STANDARD	RADIAN	RD-20-203	05/08/2009	05/08/2010
4T7290	METERING STANDARD	RADIAN	RD-20-203	03/31/2009	03/31/2010
4T7289	METERING STANDARD	RADIAN	RD-20-203	04/21/2009	04/21/2010
Test No. 2: Starting Load				**Test Date(s):** 10/13/09	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
4T7283	AUTOMATED METER TESTING SYSTEM	WECO	2300	SEE NOTE	
4T7288	METERING STANDARD	RADIAN	RD-20-203	05/08/2009	05/08/2010
4T7290	METERING STANDARD	RADIAN	RD-20-203	03/31/2009	03/31/2010
4T7289	METERING STANDARD	RADIAN	RD-20-203	04/21/2009	04/21/2010
Test No. 3: Load Performance				**Test Date(s):** 10/13/09	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
4T7283	AUTOMATED METER TESTING SYSTEM	WECO	2300	SEE NOTE	
4T7288	METERING STANDARD	RADIAN	RD-20-203	05/08/2009	05/08/2010
4T7290	METERING STANDARD	RADIAN	RD-20-203	03/31/2009	03/31/2010
4T7289	METERING STANDARD	RADIAN	RD-20-203	04/21/2009	04/21/2010
Test No. 4: Variation of Power Factor				**Test Date(s):** 10/13/09	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
4T7283	AUTOMATED METER TESTING SYSTEM	WECO	2300	SEE NOTE	
4T7288	METERING STANDARD	RADIAN	RD-20-203	05/08/2009	05/08/2010
4T7290	METERING STANDARD	RADIAN	RD-20-203	03/31/2009	03/31/2010
4T7289	METERING STANDARD	RADIAN	RD-20-203	04/21/2009	04/21/2010
Test No. 5: Effect of Variation of Voltage				**Test Date(s):** 10/13/09 & 10/14/09	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
4T7283	AUTOMATED METER TESTING SYSTEM	WECO	2300	SEE NOTE	
4T7288	METERING STANDARD	RADIAN	RD-20-203	05/08/2009	05/08/2010
4T7290	METERING STANDARD	RADIAN	RD-20-203	03/31/2009	03/31/2010
4T7289	METERING STANDARD	RADIAN	RD-20-203	04/21/2009	04/21/2010
Test No. 6: Effect of Variation of Frequency				**Test Date(s):** 10/14/09	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
4T7283	Automated Meter testing System	WECO	2300	SEE NOTE	

4T7288	Metering Standard	Radian	RD-20-203	05/08/2009	05/08/2010
4T7290	Metering Standard	Radian	RD-20-203	03/31/2009	03/31/2010
4T7289	Metering Standard	Radian	RD-20-203	04/21/2009	04/21/2010
Test No.7: Equality of Current Circuits				**Test Date(s):** 10/14/09	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
4T7283	AUTOMATED METER TESTING SYSTEM	WECO	2300	SEE NOTE	
4T7288	METERING STANDARD	RADIAN	RD-20-203	05/08/2009	05/08/2010
4T7290	METERING STANDARD	RADIAN	RD-20-203	03/31/2009	03/31/2010
4T7289	METERING STANDARD	RADIAN	RD-20-203	04/21/2009	04/21/2010
Test No.8: Internal Meter Losses				**Test Date(s):** 10/14/09 to 02/01/10	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
4T7297	PHANTOM LOAD	AVO	PA2505K	10/12/2007	10/12/2008
4T7307	POWER SUPPLY AND OSCILLATOR	ELGAR	1753B AND 403SD	SEE NOTE	
4T7285	DMM	FLUKE	87V	11/05/2009	11/05/2010
4T7144	TRUE RMS CLAMP METER	FLUKE	33	06/24/2009	06/24/2010
Test No.9: Temperature Rise				**Test Date(s):** 10/14/09 to 02/26/10	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
4T7144	TRUE RMS CLAMP METER	FLUKE	33	06/24/2009	06/24/2010
4T7294	16 CHANNEL REED MULTIPLEXER	AGILENT	34902A	08/21/2009	08/21/2010
4T7308	TRANSFORMER	GENERAL ELECTRIC	N/A	SEE NOTE	
4T7293	DATA ACQUISIRTION SWITCH UNIT	AGILENT	34970A	02/17/2010	02/17/2011
Test No.11: Effect of Internal Heating				**Test Date(s):** 10/14/09 to 12/29/09	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
4T7287	METERING STANDARD	RADIAN	RD-20-203	07/23/2009	07/23/2010
4T7283	AUTOMATED METER TESTING SYSTEM	WECO	2300	SEE NOTE	
4T7288	METERING STANDARD	RADIAN	RD-20-203	05/08/2009	05/08/2010
4T7290	METERING STANDARD	RADIAN	RD-20-203	03/31/2009	03/31/2010
Test No. 13: Stability of Performance				**Test Date(s):** 10/14/09 to 03/12/10	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
4T7144	TRUE RMS CLAMP METER	FLUKE	33	06/24/2009	06/24/2010
4T7285	DMM	FLUKE	87V	11/05/2009	11/05/2010
4T7298	PRIMARY WATTHOUR STANDARD	RADIAN RESEARCH INC	RM-11-06	02/04/2010	02/04/2011
4T7299	AUTOMATED COMPARATOR	RADIAN RESEARCH	RM-110	SEE NOTE	
4T7297	PHANTOM LOAD	AVO	PA2505K	SEE NOTE	
4T7307	POWER SUPPLY AND OSCILLATOR	ELGAR	1753B AND 403SD	SEE NOTE	
Test No. 15: Insulation				**Test Date(s):** 10/13/09 to 01/04/10	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1T4382	SHIELD ROOM 6	FIL-SHIELD	N/A	SEE NOTE	
1T4257	DIGITAL MULTIMETER	FLUKE	77	03/04/2009	03/04/2010
4T7100	HIPOT TESTER	QUADTECH	SENTRY 30	08/19/2009	08/19/2010
1T4630	THERMO/HYGROMETER	CONTROL COMPANY	S6-627-9	02/18/2008	02/18/2010

Test No. 16: Voltage Interruptions				Test Date(s): 10/13/09 to 01/06/10	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1T4382	SHIELD ROOM 6	FIL-SHIELD	N/A	SEE NOTE	
1T4630	THERMO/HYGROMETER	CONTROL COMPANY	S6-627-9	02/18/2008	02/18/2010
1T4602	TRUE RMS MULTIMETER	FLUKE	87V	11/13/2009	11/13/2010
1T4600	IMMUNITY TESTER	HAEFELY	ECOMPACT4	12/04/2009	12/04/2010
1T4627	THERMO/HYGROMETER	CONTROL COMPANY	S6-627-9	10/09/2009	10/09/2011
1T4586	BIPHASE TRANSFORMER	PRECISION ELECTRONICS	6634	SEE NOTE	
Test No. 17: Effect of High Voltage Surges				**Test Date(s):** 10/13/09 to 01/08/10	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1T4627	THERMO/HYGROMETER	CONTROL COMPANY	S6-627-9	10/09/2009	10/09/2011
1T4382	SHIELD ROOM 6	FIL-SHIELD	N/A	SEE NOTE	
1T4160	GENERATOR; PULSED - EMI SYSTEM	KEYTEK	ECAT (PLUS MODULES)	02/03/2009	02/03/2010
1T4586	TRANSFORMER - BIPHASE	PRECISION ELECTRONICS	6634	SEE NOTE	
Test No. 18: Effect of External Magnetic Field				**Test Date(s):** 01/27/10 to 02/16/10	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1T4596	REGULATED POWER SOURCE	CALIFORNIA INST.	2001RP	SEE NOTE	
1T4402	VARIABLE AUTOTRANSFORMERS	VARIAC	100-Q	SEE NOTE	
1T4579	ANSI MAGNETIC LOOP	MET	N/A	SEE NOTE	
1T5455	METER STANDARD	RADIAN	RD21	3/27/2009	3/27/2010
1T4214	TESTING CHAMBER	MET	CHAMBER #4	SEE NOTE	
2T5152	INDUCER REGULATOR	POWERSTAT	138	SEE NOTE	
Test No. 19: Ambient Temperature				**Test Date(s):** 10/14/09 to 03/12/10	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
4T7295	PHANTOM LOAD	STATES	11580-B	SEE NOTE	
4T7124	RMS DMM	TEKTRONIX	TX1	07/01/2009	07/01/2010
4T7296	PHANTOM LOAD	AVO	PA-2505K	07/16/2009	07/16/2010
1T4326	PROGRAMMABLE AC POWER SUPPLY	ELGAR	1751SL-12	SEE NOTE	
4T7144	TRUE RMS CLAMP METER	FLUKE	33	06/24/2009	06/24/2010
4T7289	METERING STANDARD	RADIAN	RD-20-203	04/21/2009	04/21/2010
4T7299	AUTOMATED COMPARATOR	RADIAN RESEARCH	RM-110	SEE NOTE	
2T5280	TEMPERATURE CHAMBER	THERMOTRON	F270-CH(V) 30-30/ECA	02/13/2009	04/13/2010
Test No. 20: Effect of Temporary Overloads				**Test Date(s):** 10/14/09 to 02/17/10	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
4T7279	HIGH CURRENT TEST SET	PHENIX TECHNOLOGIES	HC-12C	SEE NOTE	
4T7287	METERING STANDARD	RADIAN	RD-20-203	07/23/2009	07/23/2010
4T7283	AUTOMATED METER TESTING SYSTEM	WECO	2300	SEE NOTE	
4T7288	METERING STANDARD	RADIAN	RD-20-203	05/08/2009	05/08/2010
4T7290	METERING STANDARD	RADIAN	RD-20-203	03/31/2009	03/31/2010
4T7100	HIPOT TESTER	QUADTECH	SENTRY 30	08/19/2009	08/19/2010
4T7187	DIGITIZING OSCILLOSCOPE	TEKTRONIX	TDS680C	10/07/2009	10/07/2010
4T7282	CURRENT PROBE	AMEC INSTRUMENTS	30000-24-2-1	07/05/2009	08/05/2010

Test No. 21: Effect of Current Surges in Ground Conductors				Test Date(s): 03/02/10	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1T4405	TEST ROOM	MET	LAB 2	SEE NOTE	
1T4231	SURGE PULSE NETWORK	DEVIL SWITCH	20K	SEE NOTE	
1T4430	DIGITAL OSCILLOSCOPE	TEKTRONIX	TDS 5104	12/29/2009	12/29/2010
1T4636	HIGH CURRENT TRANSDUCER	PEARSON	1423	5/26/2009	5/26/2010
1T4596	POWER SUPPLY	CALIFORNIA INSTR.	2001RP	SEE NOTE	
1T4686	AC/DC CURRENT CLAMP METER	TENMA	72-6185	5/19/2009	5/19/2010
1T4402	VARIAC	GENERAL RADIO	100Q	SEE NOTE	
1T4530	POWER TRANSFORMER	DANSKE	M200	SEE NOTE	
1T5455	STANDARD METER/COMPARATOR	RADIAN	RD21-112	3/27/2009	3/27/2010
1T4602	MULTIMETER	FLUKE	87	10/29/2009	10/29/2010
Test No. 25: Electrical Fast Transients				**Test Date(s):** 01/11/10	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1T4382	SHIELD ROOM 6	FIL-SHIELD	N/A	SEE NOTE	
1T4586	TRANSFORMER - BIPHASE	PRECISION ELECTRONICS	6634	SEE NOTE	
1T4627	THERMO/HYGROMETER	CONTROL COMPANY	S6-627-9	10/09/2009	10/09/2011
1T4601	TRUE RMS MULTIMETER	FLUKE	87V	11/13/2009	11/13/2010
1T4600	IMMUNITY TESTER	HAEFELY	ECOMPACT4	12/04/2009	12/04/2010
Test No. 25a: Effect of Electrical Oscillatory SWC (Surge Withstand Capability)				**Test Date(s):** 02/02/10	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1T4382	SHIELD ROOM 6	FIL-SHIELD	N/A	SEE NOTE	
1T4627	THERMO/HYGROMETER	CONTROL COMPANY	S6-627-9	10/09/2009	10/09/2011
1T4601	TRUE RMS MULTIMETER	FLUKE	87V	11/13/2009	11/13/2010
1T4569	DUAL HIGH VOLTAGE COMPENSATED PROBE	MET LABORATORIES	N/A	SEE NOTE	
1T4685	CURRENT MONITOR	PEARSON ELECTRONICS	101	03/19/2009	03/19/2010
1T5692	OSCILLOSCOPE	TEKTRONIX	TDS680C	03/24/2009	03/24/2010
1T4489	IMPULSE SURGE GENERATOR	EMC PARTNER	MIG0603OSI	SEE NOTE	
1T4586	TRANSFORMER - BIPHASE	PRECISION ELECTRONICS	6634	SEE NOTE	
Test No. 26: Effects of Radio Frequencies Interference Test				**Test Date(s):** 01/06/10 to 01/26/10	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1T4631	THERMO/HYGROMETER	CONTROL COMPANY	S6-627-9	02/18/2008	02/18/2010
1T4642	TRANSFORMER - BIPHASE	SIGNAL TRANSFORMER	DU-1	SEE NOTE	
1T4565	LISN (24 AMP)	SOLAR ELECTRONICS	9252-50-R-24-BNC	10/14/2009	10/14/2010
1T4550	ISOTROPIC FIELD PROBE	HOLADAY	HI-4422	06/30/2009	06/30/2010
1T2624	ANTENNA; LAZY-H	ELECTRO-METRICS	PEA-25	SEE NOTE	
1T4456	EMC VIDEO CAMERA #2	SONY	CCD=TRV328	SEE NOTE	
1T4380	SYNTHESIZED RF SIGNAL GENERATOR	FLUKE	6061A	10/16/2009	10/16/2010
1T4215	AMPLIFIER; WIDEBAND SYSTEM	IFI	CMX5001	SEE NOTE	
1T4476	POWER METER	HEWLETT PACKARD	EPM-442A	05/28/2009	05/28/2010
1T2658	ANTENNA; BICON	EMCO	3109	08/27/2009	08/27/2010
1T4119	ANTENNA; BICONILOG	EMCO	3143	SEE NOTE	

1T2511	ANTENNA; HORN	EMCO	3115	08/21/2009	08/21/2010
1T4557	MICROWAVE INSTRUMENTATION AMPLIFIER (TWF)	CPI	VZL-6943J2	SEE NOTE	
1T4555	MICROWAVE INSTRUMENTATION AMPLIFIER (TWT)	COMM. & POWER INDUSTRIES CAN	VZS/C-693J2 SERIES	SEE NOTE	
1T4556	MICROWAVE INSTRUMENTATION AMPLIFIER (TWT)	CPI	VZM-6993J4	SEE NOTE	
1T4354	SIGNAL GENERATOR	HEWLETT PACKARD	83752A	03/11/2010	03/11/2011
Test No. 27: Conducted Emissions				**Test Date(s):** 01/18/10	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1T4382	SHIELD ROOM 6	FIL-SHIELD	N/A	SEE NOTE	
1T4601	TRUE RMS MULTIMETER	FLUKE	87V	11/13/2009	11/13/2010
1T4627	THERMO/HYGROMETER	CONTROL COMPANY	S6-627-9	10/09/2009	10/09/2011
1T4586	TRANSFORMER - BIPHASE	PRECISION ELECTRONICS	6634	SEE NOTE	
1T4621	ESA-E SERIES SPECTRUM ANALYZER	AGILENT	E4402B	03/20/2009	03/20/2010
1T4565	LISN (24 AMP)	SOLAR ELECTRONICS	9252-50-R-24-BNC	10/14/2009	10/14/2010
1T4502	COMB GENERATOR	COM-POWER	CGC-255	09/23/2009	09/23/2010
Test No. 27: Radiated Emissions				**Test Date(s):** 10/13/09 to 01/18/10	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1T4300	SEMI-ANECHOIC CHAMBER # 1	EMC TEST SYSTEMS	NONE	08/24/2007	08/24/2010
1T4303	ANTENNA; BILOG	SCHAFNER - CHASE EMC	CBL6140A	07/29/2009	07/29/2010
1T4619	THERMO-HYGROMETER	CONTROL COMPANY	S6-627-9	11/07/2008	11/07/2010
1T4409	EMI RECEIVER	ROHDE & SCHWARZ	ESIB7	05/07/2009	05/07/2010
1T4290	LISN; 50UH/50 OHM	SOLAR ELECTRONICS	8116-50-TS-100-N	12/30/2009	12/30/2010
1T4286	LISN; HIGH POWER	SOLAR ELECTRONICS	8610-50-TS-100-N	02/04/2010	02/04/2011
1T4586	BIPHASE TRANSFORMER	PRECISION ELECTRONICS	6634	SEE NOTE	
1T4568	RADIATING NOISE SOURCE	MET LABORATORIES	N/A	SEE NOTE	
1T4564	LISN (24 AMP)	SOLAR ELECTRONICS	9252-50-R-24-BNC	09/09/2009	09/09/2010
Test No. 28: Electrostatic Discharge				**Test Date(s):** 02/03/10	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1T4382	SHIELD ROOM 6	FIL-SHIELD	N/A	SEE NOTE	
1T4627	THERMO/HYGROMETER	CONTROL COMPANY	S6-627-9	10/09/2009	10/09/2011
1T4604	ESD SIMULATOR	TESEQ	NSG-437	11/13/2009	11/13/2010
1T4586	TRANSFORMER - BIPHASE	PRECISION ELECTRONICS	6634	SEE NOTE	
1T5692	OSCILLOSCOPE	TEKTRONIX	TDS680C	03/24/2009	03/24/2010
1T4258	DIGITAL MULTIMETER	FLUKE	83	12/14/2009	12/14/2010
Test No. 30: Effects of Variation of Operating Temperature				**Test Date(s):** 10/14/09 to 02/15/10	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
4T7296	PHANTOM LOAD	AVO	PA-2505K	07/16/2009	07/16/2010
4T7307	POWER SUPPLY AND OSCILLATOR	ELGAR	1753B AND 403SD	SEE NOTE	
2T5879	TEMPERATURE HUMIDITY CHAMBER/ CONTROLLER/ TRANSMITTER	THERMOTRON/ THERMOTRON/VAISALA	SE-1000-3-3/ 7800/ HMM30C	08/18/2009	09/18/2010

4T7144	TRUE RMS CLAMP METER	FLUKE	33	06/24/2009	06/24/2010
4T7125	RMS DMM	FLUKE	87III	10/16/2009	10/16/2010
Test No. 31: Effects of Variation of Relative Humidity				**Test Date(s):** 10/14/09 to 02/15/10	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
4T7296	PHANTOM LOAD	AVO	PA-2505K	07/16/2009	07/16/2010
4T7307	POWER SUPPLY AND OSCILLATOR	ELGAR	1753B AND 403SD	SEE NOTE	
2T5879	TEMPERATURE HUMIDITY CHAMBER/ CONTROLLER/ TRANSMITTER	THERMOTRON/ THERMOTRON/VAISALA	SE-1000-3-3/ 7800/ HMM30C	08/18/2009	09/18/2010
4T7144	TRUE RMS CLAMP METER	FLUKE	33	06/24/2009	06/24/2010
4T7125	RMS DMM	FLUKE	87III	10/16/2009	10/16/2010
Test No. 32: Mechanical Shock				**Test Date(s):** 12/18/09	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
2T5757	VIBRATION CONTROLLER	DACTRON	LASER SCS	3-MAR-2009	3-MAR-2010
2T5144	VIBRATION EXCITER	THERMOTRON	DS-640-985	SEE NOTE	
2T3660	CONTROL PANEL / SHAKER	THERMOTRON	DS-640-985-16	SEE NOTE	
2T5895	ACCELEROMETER	PCB PIEZOTRONICS	J353B34	28-AUG-2009	28-AUG-2010
Test No. 34: Vibration				**Test Date(s):** 12/18/09	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
2T5757	VIBRATION CONTROLLER	DACTRON	LASER SCS	3-MAR-2009	3-MAR-2010
2T5144	VIBRATION EXCITER	THERMOTRON	DS-640-985	SEE NOTE	
2T3660	CONTROL PANEL / SHAKER	THERMOTRON	DS-640-985-16	SEE NOTE	
2T5895	ACCELEROMETER	PCB PIEZOTRONICS	J353B34	28-AUG-2009	28-AUG-2010
4T7287	METERING STANDARD	RADIAN	RD-20-203	07/23/2009	07/23/2010
4T7283	AUTOMATED METER TESTING SYSTEM	WECO	2300	SEE NOTE	
4T7288	METERING STANDARD	RADIAN	RD-20-203	05/08/2009	05/08/2010
4T7290	METERING STANDARD	RADIAN	RD-20-203	03/31/2009	03/31/2010
Test No. 35: Transportation Vibration				**Test Date(s):** 10/14/09 to 01/04/10	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
2T5526	LOOSE CARGO TESTER	MET	SERIES 15H	SEE NOTE	
2T5436	HAND DIGITAL TACHOMETER	SHIMPO	DT205B	02/11/2009	04/11/2010
Test No. 36: Weather Simulation				**Test Date(s):** 10/14/09 to 02/18/10	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
2T5958	XENON TEST CHAMBER	Q-LAB CORPORATION	Q-SUN XE-3-HBS	SEE NOTE	
2T5961	RADIOMETER	Q-LAB CORPORATION	CR20/340/BB	11/16/2009	11/16/2010
2T5769	CALIBRATOR	FLUKE	741B	03/16/2009	03/16/2010
4T7287	METERING STANDARD	RADIAN	RD-20-203	07/23/2009	07/23/2010
4T7283	AUTOMATED METER TESTING SYSTEM	WECO	2300	SEE NOTE	
4T7288	METERING STANDARD	RADIAN	RD-20-203	05/08/2009	05/08/2010
4T7290	METERING STANDARD	RADIAN	RD-20-203	03/31/2009	03/31/2010
Test No. 37: Salt Spray				**Test Date(s):** 10/14/09 to 03/05/10	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**

2T5574	CORROSION TEST CHAMBER (S2)	SINGLETON/ THERMOLOGIC/ RED LION	22/ DINFJ32H1-N-N-23/ TSC12004	10/28/2009	12/28/2010
Test No. 38: Rain-tightness			**Test Date(s):** 10/14/09 to 03/05/10		
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
4T7310	TIMER	CONTROL COMPANY	5007	11/26/2008	11/26/2010
3T6561	PRESSURE GAUGE	OMEGA ENGINEERING	PGS-25L-15	07/24/2009	07/24/2010
3T6562	PRESSURE GUAGE	OMEGA ENGINEERING	PGS-25L-15	07/24/2009	07/24/2010
3T6563	PRESSURE GUAGE	OMEGA ENGINEERING	PGS-25L-15	07/24/2009	07/24/2010

Table 132. Test Equipment

Note: Functionally verified test equipment is verified using calibrated instrumentation at the time of testing.