TEST / CALIBRATION REPORT

Type Test Report
for
MECO 3 Phase Wattmeter

Testing as per IS 1248:1993 (Category II)

ELECTRONICS REGIONAL TEST LABORATORY (WEST)

MINISTRY OF COMMUNICATIONS & INFORMATION TECHNOLOGY, (STQC Dte.)

Government of India

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MEMORANDUM

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2. The report shall not be regarded in any way diminishing the normal contractual responsibilities / obligations between the customer and **ERTL (W).**

3. The result reported in this report are valid only at the time of and under the stated conditions of the measurements.

1. **SCOPE**

1.1 Service Request No : ERTL(W) / 20022611 dated 31-Dec.-2002

1.1.1 Service Request finalised on : 31-Dec.-2002.

1.2 Requested by
(Name and address of organisation) : MECO INSTRUMENTS PVT LTD.,
301, BHARAT INDUSTRIAL EASTATE,
T.J. ROAD, SEWREE (W),
MUMBAI – 400 015.

1.3

Description	Qty	Manufacturer	Model	Serial Nos.
3 Phase Wattmeter (Analog Panel Meter) 0 - 4 kW, CLASS-1.5	03 Nos.	MECO	96QW33	022952 - SAMPLE 1 (S-1) 031056 - SAMPLE 2 (S-2) 031057 - SAMPLE 3 (S-3)

1.4 Test specifications : TYPE TEST AS PER IS 1248:1993,
CATEGORY II

1.5 Lab Ambient : Temperature : (25 ±2) deg.C
Humidity : (55 ±5) % RH

1.6 Test Equipment used :

1.	Energy Power Calibrator	E&S/126
2.	D.M.M	E&S/120
3.	Digital Insulation Tester	E&S/121
4.	Energy Meter Calibrator	E&S/125
5.	W/I Auto Tester	E&S/066
6.	Environmental Chamber	ENV/042
7.	Environmental Chamber	WK 1000-2
8.	Vibration Machine	ENV/008
9.	Shock Test Machine	ENV/018

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2.0 Test Results

Sr.No.	Test/Parameter	Test Condition	Requirement	Observation			Remark
2.1	Insulation Resistance	At 500 V DC for 1 min. between terminals shorted together and body.	Not less than 5 M ohm	S-1	S-2	S-3	Complied
				> 2000 M ohm	> 2000 M ohm	> 2000 M ohm	
2.2	High Voltage Test	AT 2 kV AC rms for 1 min. between terminals shorted together and foil wrapped on body.	There shall not be any breakdown/ flashover.	No breakdown or flashover observed in case of any of the 3 samples			Complied
2.3	Intrinsic Error	At following equidistant points	Class index (1.5%)	S - 1	S - 2	S - 3	Complied
		1 kW		0.48 %	0.3 %	0.48 %	
		2 kW		0.25 %	-0.68 %	-0.38 %	
		3 kW		0 %	-0.75 %	-0.38 %	
		4 kW		1.5 %	-1.15 %	-0.98 %	
2.4	Variation due to influencial quantities						
2.4.1	Variation due to ambient temp.	Lower temp. 10 deg. C, Upper temp. 37 deg.C Intrinsic error checked at following equidistant points.	Permissible variation shall be 100% of class index	S-1	S-2	S-3	Complied
		1 kW		0.78 %	0.73 %	1.35 %	
		2 kW		1.08 %	1.30 %	1.28 %	
		3 kW		0.90 %	1.45 %	1.05 %	
		4 kW		0.65 %	1.45 %	1.45 %	
2.4.2	Variation due to humidity	Lower Relative humidity 25%, Upper Relative humidity 80% Intrinsic error checked at following equidistant points	Permissible variation shall be 100% of class index				Complied
		1 kW		0.08 %	0.23 %	0.5 %	
		2 kW		0.23 %	0.23 %	0.6 %	
		3 kW		0.15 %	0.15 %	0.7 %	
		4 kW		0.38 %	0.45 %	0.2 %	

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Sr.No.	Test/Parameter	Test Condition	Requirement	Observation			Remark
				S-1	S-2	S-3	
2.4.3	Variation due to distortion of AC measured quantity	Superimpose 20 % of third harmonics up on the fundamental wave form..	Permissible variation shall be 100% of class index	0 %	0 %	0 %	Complied
2.4.4	Variation due to frequency of AC measured quantity	Frequency varied from 45 Hz to 55 Hz. 1 kW 2 kW 3 kW 4 kW	Permissible variation shall be 100% of class index	 0.78 % -0.73 % -1.18 % 0.9 %	 0.23 % 0.63 % -0.8 % -1.38 %	 -0.43 % -0.83 % -1.13 % 1.13 %	Complied
2.4.5	Variation due to position	Intrinsic error to be measured at reference plane and then at 5 deg. Inclination plane in forward, backward, left & right direction. Maximum deviation at following equidistant points 1 kW 2 kW 3 kW 4 kW	Permissible variation shall be 50% of class index	 0.23 % 0.33 % 0.15 % -0.5 %	 0.33 % 0.2 % 0.33 % 0.15 %	 0.28 % 0.15 % -0.5 % -0.25 %	Complied
2.4.6	Variation due to magnetic field of external origin	AC excitation of upper limit under an external magnetic field of 0.4kA/m. Maximum deviation to be observed.	6 % of fiducial value	0.13 %	0.2 %	0.18 %	Complied

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Sr.No.	Test/Parameter	Test Condition	Requirement	Observation			Remark
				S-1	S-2	S-3	
2.4.7	Variation due to ferromagnetic supports	Accuracy test carried out by mounting UUT on Non Ferrous Panel (PVC) & Ferrous Panel at following equidistant points	Within the limit of intrinsic error				Complied
		1 kW		-0.2 %	0 %	0.4 %	
		2 kW		-0.1 %	0.03 %	0.38 %	
		3 kW		-0.2 %	-0.05 %	0.15 %	
		4 kW		-0.65 %	0 %	0 %	
2.4.8	Variation due to conductive supports	Accuracy test carried out by mounting UUT on conductive support following equidistant points	Shall meet the requirement of intrinsic error				Complied
		1 kW		0.9 %	0.43 %	0.68 %	
		2 kW		0.48 %	-0.3 %	0.45 %	
		3 kW		-0.2 %	-0.63 %	0.45 %	
		4 kW		-1.28 %	-1.05 %	-0.28 %	
2.4.9	Variation due to voltage component of measured quantity	Excitation at the middle of the scale. Voltage: 440 V Voltage : 374 V Voltage : 506 V	Permissible variation shall be 100% of class index	 0.03 % -0.25 %	 0 % -0.38 %	 -0.08 % -0.18 %	Complied
2.4.10	Variation due to power factor	Excitation at the middle of the scale at unity power factor Power factor : 0.5 lagging	Permissible variation shall be 100% of class index	0.58 %	0.3 %	0.33 %	Complied
2.4.11	Variation due to phase balance	Excitation at the middle of the scale at balanced current	200 % of class index				Complied
		Disconnect phase R current		1.13 %	0.35 %	1.5 %	
		Disconnect phase Y current		0.75 %	0.4 %	1 %	
		Disconnect phase B current		1.38 %	0.4 %	1.5 %	

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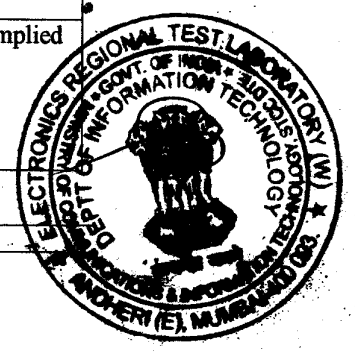

Sr.No.	Test/Parameter	Test Condition	Requirement	Observation			Remark
2.5	Damping			S-1	S-2	S-3	
2.5.1	Mechanical overshoot	By suddenly applying 2/3rd of measuring range & note down the % overshoot.	Shall not exceed 20% of scale length	18 %	18 %	18 %	Complied
2.5.2	Response time	By suddenly applying 2/3rd of measuring range & note down time (sec).	Within 1.5% scale length after 4 s.	Indices reached the position of rest within 4s in each case			Complied
2.6	Self Heating	By applying 90% of upper limit of measuring range for 30 to 35 min. & note down the deviation (%)	Shall comply with the requirements of class index.	S-1	S-2	S-3	Complied
				0.38 %	0.4 %	0.38 %	
2.7	Continuous overload	a) By applying 120% of upper limit for 2h while maintaining current at rated value.	a) Residual deflection shall not exceed 1% of scale length	No residual deflection observed			Complied
		b) Accuracy test at following equidistant points after 2 h.	b) Shall comply with the accuracy requirement.	S-1	S-2	S-3	
		1 kW		0.4 %	0.93 %	0.63 %	
		2 kW		0.7 %	1.08 %	1.35 %	
		3 kW		0.48 %	1.08 %	1.18 %	
		4 kW		0.55 %	1.25 %	1.45 %	
		c) By applying 120% of upper limit of current for 2h while maintaining voltage at rated value.					
		d) Accuracy test at following equidistant points after 2 h.					
		1 kW		0.6 %	0.83 %	0.68 %	
		2 kW		0.7 %	1 %	1.28 %	
		3 kW		0.48 %	0.88 %	1.38 %	
		4 kW		0.38 %	1.13 %	1.43 %	

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Sr.No.	Test/Parameter	Test Condition	Requirement	Observation			Remark
2.8	Overloads of short duration	a) Apply 10 times of the current range while maintaining rated voltage for 0.5s nine times at an interval of 60s and once for 5s. b) Apply 2 times of the voltaget range while maintaining rated current for 5s. c) Accuracy test at the following equidistant points : 1 kW 2 kW 3 kW 4 kW	a) Deviation of index from zero scale mark shall not exceed 1.5% of scale length b) Shall comply with accuracy requirements.	No deviation observed on any of the three samples.			Complied
				S-1	S-2	S-3	
				0.6 % 0.05 % -0.48 % 0 %	0.4 % 0.63 % 0.33 % 0.38 %	0.38 % 0.68 % 0.7 % 0.73 %	
2.9	Environmental Tests						
2.9.1	Temp. cycling	55 deg.C for 16h & -10 deg.C for 8h. 3 cycles while at 80% of the upper limit of excitation. During the last cycle at the end of 16h and while at high temp. slowly increase & decrease the excitation until index reaches the upper limit of measuring range & return to zero. Similarly after 8h at lower temp. slowly increase & decrease the excitation until index reaches the upper limit of measuring range & return to zero.	To be conditioned	Conditioned Indices were responding to excitation change.			-----

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Sr.No.	Test/Parameter	Test Condition	Requirement	Observation			Remark
2.9.2	Post Measurement Intrinsic error	At the following equidistant points : 1 kW 2 kW 3 kW 4 kW	Error shall be within class index (1.5%)	S-1 1 % 0.38 % -0.25 % -1.5 %	S-2 0.63 % -0.13 % -0.5 % -0.88 %	S-3 0.78 % 0.33 % 0.28 % -0.25 %	Complied
2.9.3	Damp Heat Cyclic Test	As per IS 9000. Part 5 Sec. 1 (16+8) h) cycle. 2 cycles. Recovery 24 h.	To be conditioned	Conditioned			----
2.9.4	Post Measurement Intrinsic error	At the following equidistant points : 1 kW 2 kW 3 kW 4 kW	Class index (1.5%)	S - 1 1.08 % 0.85 % 0.25 % -1.5 %	S - 2 0.85 % -0.05 % -0.25 % -0.4 %	S - 3 1.38 % 0.85 % 1 % 0.25 %	Complied
2.10	Deviation from zero	Energise the samples for 30s at upper limit of measuring range. Quickly reduce the excitation to zero. Deviation from zero shall be measured 15s after the excitation has been reduced to zero. Energize voltage circuit only.	Deviation expressed as percentage of scale length shall not exceed more than 50% of class index. Shall not exceed the value corresponding to 100% of the class index	No deviation observed in any of the three samples. S-1 0 %	 S-2 0.5 %	 S-3 0.5 %	Complied

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Sr.No.	Test/Parameter	Test Condition	Requirement	Observation			Remark
2.11	Vibration test	As per IS 9000 Part 8 Sweep range: 10-150-10 Hz Displacement amplitude: 0.15 mm peak in the range 10-60 Hz, Acceleration: 2g in the range: 60-150 Hz, Sweep Rate: 1 octave/min., Duration : 6 h. Endurance shall be performed at resonance frequency. Vibration shall be applied at the resonance frequency for 6h in that direction. If the resonance is observed in any of these 3 directions, the equipment shall be subjected to vibration at each of the frequencies 25, 50, 100 and 150 Hz in each of the 3 mutually perpendicular direction so that the total duration shall not exceed 6 h.	To be conditioned	Conditioned No visual damage observed			----
2.12	Accuracy Test (Post Vibration)	At the following equidistant points : 1 kW 2 kW 3 kW 4 kW	Error shall not deviate more than 50% of class index	S-1 0.15 % 0.45% 0.65 % 0.18 %	S-2 0.1 % 0.38 % 0.2 % 0.3 %	S-3 0.23 % 0.4 % 0.2 % 0.13 %	Complied

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Sr.No.	Test/Parameter	Test Condition	Requirement	Observation			Remark
2.13	Shock Test	As per IS 9000 P-7, Peak Acceleration: 15g, Pulse shape: half sine, Duration: 11 ms, 3 shocks in both directions of 3 mutually perpendicular axes (total 18 shocks)	To be conditioned	Conditioned			-----
2.14	Accuracy Test (Post Shock)	At the following equidistant points : 1 kW 2 kW 3 kW 4 kW	Error after test shall not deviate by more than 100% of class index from the original values measured before shock test.	S-1 0.53 % 0.23 % 0.3 % 0.05 %	S-2 0.25 % 0.23 % 0.1 % 0.13 %	S-3 0.1 % 0.25 % 0.03 % 0.1 %	Complied
2.15	Life Test	The UUT shall be subjected to 1,50,000 full scale deflections, the impulse supplied being of such amplitude that the pointer reaches max. value of the scale without impinging on the end stop. ON for 1 sec OFF for 4 sec during one cycle.	To be conditioned	Conditioned			-----
2.16	Accuracy Test (Post Life Test)	At the following equidistant points : 1 kW 2 kW 3 kW 4 kW	Error shall be within class index (1.5 %)	S-1 0.6 % 1.23 % 0.33 % 0.08 %	S-2 0.6 % 1.13 % 1.05 % 0.58 %	S-3 0.83 % 1.03 % 0.95 % 1.13 %	Complied

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3.0 **General Remarks** :

REPORT APPROVED BY **REPORT PREPARED BY**

HEAD (E&S) **OIC (E&S), MUMBAI-400 093.**

OUR ACCREDITATION STATUS

ERTL (W) set up under the STQC Directorate, Ministry of Communications & Information Technology, Govt. of India has been accreditated under number of national / international systems as follows :

SYSTEM	AREA	STATUS
IECQ (International Electro-technical Commission on Quality Assessment System for Electronic Components)	**Component Testing** • Resistors (Fixed) • Capacitors (Fixed)	Accreditated as ITL (Independent Test Laboratory)
NABL (C), India National Accreditational Board for Test & Calibration laboratories (Calibration System)	**Calibration** • Electro-technical discipline • Thermal discipline • Mechanical discipline	Accreditated Calibration Laboratory
NABL(T), India National Accreditational Board for Test & Calibration laboratories (Testing System)	Electronic & Electrical Testing	Accreditated Test Laboratory
IECEE-CE-Scheme	• Mains Operated Electronic Consumer Products	Approved as a CB test Laboratory
Other recognisation		Recognised by CSPO of State Govt., DOT, Naval Docyard, LCSO etc.