Doc No: 1200ER05   Rev: 00

CALsys 1200 Evaluation Report

An evaluation report of the CALsys 1200 Metal Block Bath

Manufactured by Tempsens Instruments (II) Pvt Ltd

INTRODUCTION

The CALsys 1200 is the latest version of Tempsens makes most popular High Accuracy Dry Block calibration Bath. It works over the temperature range 250 Deg C to 1200 Deg C.

At Tempsens it is our earnest desire to present for our customer's consideration as much useful information as possible and to this end we have spent a substantial amount of time evaluating our products.

The results of the evaluation of an accurate Metal block bath can be presented in many formats some of which will give an optimistic or indeed a pessimistic view of how the products operate.

This evaluation report describes the performance of the Tempsens make CALsys 1200 that can be used as a guide to the laboratory performance.

A. **Radial Temperature Homogeneity:**

What is Radial Temperature Homogeneity and why it is important to measure

Radial uniformity refers to temperature differences between wells of the block or sleeve. This nonuniformity is strongly influenced by the difference between the block and ambient temperature. A larger temperature difference from ambient will result in a larger potential temperature calibration error. Therefore radial inhomogeneity should be measured at extremes (relative to ambient temperature) in an instrument's temperature range.

Test method:

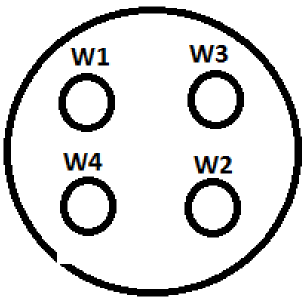
The temperature differences between the zones in the individual bores provided for the measurements are measured with one or several suitable thermometers at three different temperature representative of the field of application and covering the extreme temperature which may occur. If there is only one bore no measurement has to be carried out.

For CALsys 1200, we consider 250 Deg C, 700 Deg C and 1200 Deg C respectively. As example at 250 Deg C two RTD (designed for small steam conduction) were placed in each of the holes. Measurements were recorded and then the probes were interchanged between the two pockets and repeat measurements made. The temperature Difference was calculated to remove the small offsets between the two probes.

For calibrators having fewer than four wells, it may be necessary to determine differences by cyclic exchange. The difference between two wells with two thermometers may be determined with the following Formula:

Temperature Difference = [((P1W1 – P1W2) + (P2W1 - P2W2)) / 2}]

Note: P1 = probe 1, W1 = well 1 and so on. P1W1 is read as the value of probe 1 in well 1.



Radial Temperature Homogeneity at CALsys 1200

Temp (Deg C)	Sensor	Hole 1	Hole 3
250	RTD Sr.No 4391	249.1	249.25
	RTD Sr.No 438	249.04	249.24
Radial Uniformity : -0.17			

Temp (Deg C)	Sensor	Hole 1	Hole 3
700	T/c N type Sr.No1445	703.82	704.83
	T/c N type Sr.No1582	706.4	705.02
Radial Uniformity : 0.19			

Temp (Deg C)	Sensor	Hole 1	Hole 3
1200	T/c N type Sr.No1445	1209.98	1210.1
	T/c N type Sr.No1582	1209.5	1209.88
Radial Uniformity : -0.25			

B. Temperature Stability

Temperature stability is measured with a thermometer and readout with adequate sensitivity and resolution to measure the control fluctuations in the block. A typical time period for stability measurements of a dry-well is about 30 minutes at any specific temperature. Other time periods may be applied depending on how the calibrator is to be used. Temperature stability may vary at different temperatures. The instrument should be characterized over its range, and typically three sets of stability measurements are adequate. Dry-wells that are heated only (that is they utilize no cooling systems to achieve below-ambient temperatures) are measured at their maximum and minimum temperatures and at the midpoint of their ranges. Stability measurements for cold dry-wells are made at their maximum and minimum temperatures as well as near room temperature. Specific temperatures of interest by the user may also be incorporated.

Test Method:

Stability is the measure of the temperature deviations over the measurement period, after temperature control has stabilized. The stability data can be viewed in two ways (see Figure 3). What may be called "peak" stability is often evaluated as plus or minus (±) one-half the difference between of the maximum and minimum values of the data set:

Peak Stability = ± (Tmax – Tmin) / 2.

Temp Set Point	Maximum	Minimum	Peak Stability
250 Deg C	250.720	250.708	0.06
700 Deg C	703.69	703.47	0.11
1200 Deg C	1200.87	1200.40	0.23

C. HEAT UP TIME and COOL DOWN TIME

HEAT UP TIME

250 C to 110°C 10 min

COOL DOWN TIME

1200 to 250° C 170 min

Heat Up Time	
Time (Min)	Temp (Deg C)
0	24.8
1	70.2
3	174.4
5	404
10	706
15	888.4
20	1029
25	1145
30	1182
35	1196
40	1200

Cool Down Time	
Time (Min)	Temp (Deg C)
0	1200
1	1185
5	1111
10	1042
15	984
30	826
60	628
90	483
120	375
150	295
171	250