Annexure - I

Specification for Metrology Wells Code No. ZMES18076017

SCOPE OF SUPPLY

- 2 Nos. Metrology Well for entire range from -45ºC to 700ºC as per specification in annexure II (A) & II (B).
- Accessories as per annexure III C, D, E, F & G.
- Detailed calibration certificate for each well traceable to International Standard.
- Commissioning of instrument in instrumentation lab of HEEP and interfacing with desktop PC and prove out of all features as per specification of annexure II & III.
- At least one week free training for two persons at supplier work or specialized training center in operation and maintenance of metrology well, operation of software and fundamentals of temperature calibration.

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Annexure - II (A)

Specification for Metrology Well of range -45 ºC to 140 ºC

Code No.: ZMES18076017

1.	Range	-45ºC to 140 ºC
2.	Display Accuracy	±0.1 ºC full range
3.	Stability	±0.005ºC full range
4.	Axial Uniformity (60 mm)	± 0.1 ºC at -45 ºC ± 0.04 ºC at -35 ºC ± 0.02 ºC at 0 ºC ± 0.07 ºC at 140 ºC
5.	Radial Uniformity	± 0.01 ºC full range
6.	Loading Effect (with a 6.35mm reference probe and three 6.35 mm probes)	± 0.02 ºC at -45 ºC ± 0.005 ºC at -35 ºC ± 0.01 ºC at 140 ºC
7.	Hysteresis	± 0.025 ºC
8.	Well Depth	160 mm (6.3 in)
9.	Resolution	0.001 ºC
10.	Display	LCD, ºC or ºF, user-selectable
11.	Key Pad	Ten key with decimal and +/- button. Function keys, menu key and ºC/ ºF key.
12.	Cooling Time	23 ºC to -45 ºC : 45 min or less 23 ºC to 14 ºC : 20 min or less
13.	Heating Time	23 ºC to 140ºC : 32 min or less -45 ºC to 140ºC : 45 min or less
14.	Size (height x width x depth)	366 x 203 x 323 mm (14.4 x 8 x 12.7 in)
15.	Power	115 VAC (±10%), 6.3 A or 230 VAC (± 10%), 3.15 A
16.	Computer Interface	RS-232 Interface with 9930 Interface- it control s/w included
17.	Traceable Calibration (NIST)	Data at -45 ºC, 0 ºC, 50 ºC, 100 ºC and 140 ºC
	Built- in Reference Input	
18.	Temperature Range	-200 ºC to 962 ºC (-328 ºF to 1764 ºF)
19.	Resistance Range	0 O to 400 O, auto-ranging
20.	Characterizations	ITS-90 sub ranges 4,6,7,8,9,10 and 11 Callendar-Van Dusen (CVD): R0,a,ß,d
21.	Resistance Accuracy	0 O to 20 O: 0.0005 O 20 O to 400 O : 25 ppm
22.	Temperature Accuracy	± 0.015 ºC or better

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Code No.: ZMES18076017

23.	Resistance Resolution	0 O to 20 O : 0.0001 O 20 O to 400 O: 0.001 O
24.	Measurement Period	1 second
25.	Probe Connection	4-wire with shield, 5-pin DIN connector
26.	Calibration	NIST-traceable calibration required

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Specification for Metrology Well of range 50 ºC to 700 ºC

Code No.: ZMES18076017

1.	Range	50 ºC to 700 ºC
2.	Display Accuracy	±0.2 ºC at 425 ºC ±0.25 ºC at 660 ºC
3.	Stability	±0.005ºC to 100 ºC ±0.01ºC to 425 ºC ±0.03ºC to 700 ºC
4.	Axial Uniformity (60 mm)	± 0.01 ºC at 100 ºC ± 0.25 ºC at 425 ºC ± 0.4 ºC at 700 ºC
5.	Radial Uniformity	± 0.01 ºC at 100 ºC ± 0.025 ºC at 425 ºC ± 0.04 ºC at 700 ºC
6.	Loading Effect (with a 6.35mm reference probe and three 6.35 mm probes)	± 0.02 ºC at 425 ºC ± 0.04 ºC at 700 ºC
7.	Hysteresis	± 0.07 ºC
8.	Well Depth	203 mm (8 in)
9.	Resolution	0.001 ºC
10.	Display	LCD, ºC or ºF, user-selectable
11.	Key Pad	Ten key with decimal and +/- button. Function keys, menu key and ºC/ ºF key.
12.	Cooling Time	700 ºC to 50 ºC : 235 min or less 700 ºC to 100 ºC : 153 min or less
13.	Heating Time	46 min: 50 ºC to 700ºC
14.	Size (height x width x depth)	366 x 203 x 323 mm (14.4 x 8 x 12.7 in)
15.	Power	115 VAC (±10%), 10 A or 230 VAC (± 10%), 5 A
16.	Computer Interface	RS-232 Interface with 9930 Interface- it control s/w included
17.	Traceable Calibration (NIST)	Data at 100 ºC, 200 ºC, 350 ºC, 500 ºC and 660 ºC
	Built- in Reference Input	
18.	Temperature Range	-200 ºC to 962 ºC (-328 ºF to 1764 ºF)
19.	Resistance Range	0 O to 400 O, auto-ranging
20.	Characterizations	ITS-90 sub ranges 4,6,7,8,9,10 and 11 Callendar-Van Dusen (CVD): R0,a,ß,d
21.	Resistance Accuracy	0 O to 20 O: 0.0005 O 20 O to 400 O : 25 ppm

Contd----2

Code No.: ZMES18076017

22.	Temperature Accuracy	0 ºC -150 ºC - ± 0.015 ºC or better 150 ºC - 500 ºC - ± 0.020 ºC or better 500 ºC - 700 ºC - ± 0.030 ºC or better
23.	Resistance Resolution	0 O to 20 O : 0.0001 O 20 O to 400 O: 0.001 O
24.	Measurement Period	1 second
25.	Probe Connection	4-wire with shield, 5-pin DIN connector
26.	Calibration	NIST-traceable calibration required

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Annexure - III

Specification for Accessories

Code No.: ZMES18076017

Accessories required

- 4 channel Thermometer as per annexure ‘C’
- Reference PRT as per annexure ‘D’
- Desktop PC for data logging as per annexure ‘E’
- Inserts as per annexure ‘F’
- Software Interface as per annexure ‘G’

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Annexure – C

Specification for 4 Channel Precision Thermometer

Code No.: ZMES18076017

1.	Inputs	2 Channels PRT/Thermistor and 2 channels TC
2.	Temperature Range	-50 ºC to 700 ºC
3.	Measurement Range	0 to 400O
4.	Characterizations	ITS-90, IEC 751 (DIN”385”), Callendar-Van Dusen
5.	Temperature Accuracy	0 ºC -100 ºC - ±0.010 ºC or better 100 ºC -700 ºC - ±0.025 ºC or better 0 ºC -50 ºC - ±0.004 ºC or better
6.	Temperature resolution	0.001º
7.	Resistance/Voltage accuracy	±25 ppm of rdg.
8.	Measurement Interval	0.1 second to 1 hour, inputs may be read sequentially or simultaneously at 1 second or grater interval
9.	Excitation Current	1mA, reversing
10.	Display	1.3" x 5" backlit LCD graphical display
11.	Display Units	ºC, ºF, K, ´O, K´O, mV
12.	Data Logging	Upto 8,000 time and date stamped measurements cab be logged.
13.	Logging Intervals	0.1, 0.2,0.5,1,2,5,10,30 or 60sec,2,5,10,30 or 60 minutes
14.	Averaging	2 to 10 readings
15.	Probe connection	DWF connect accept mini spade lug, bare wire or mini banana plug terminations
16.	Communications	RS-232, IR ports included and IEEE 488 (GPIB)
17.	AC Power	230V, 50Hz + 10%
18.	DC Power	12 to 16 V DC, 0.5 A
19.	Battery	NiMH, 8 hours operation
20.	Calibration	NIST- traceable resistance calibration required

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Specification for Reference PRT's

Code No.: ZMES18076017

1.	Temperature Range	-200 ºC to 661 ºC
2.	Handle Temperature	0 ºC to 80 ºC
3.	R_{TPW}	100 Ohm (+/- 1Ohm)
4.	W (Ga)	=1.11807
5.	Calibration Uncertainty (K=2)	±0.006 ºC at -200 ºC ±0.004 ºC at 0 ºC ±0.009 ºC at 420 ºC ±0.014 ºC at 661 ºC
6.	Stability	±0.003 ºC
7.	Long-Term Drift	<0.03 ºC/500 hours at 661 ºC
8.	Sheath	Inconel ™ 600
9.	Lead Wires	4-wire Super-Flex PVC, 22 AGW
10.	Termination	Gold-plated spade lugs
11.	Size	0.25" dia. x 15" standard

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Annexure – E

Specification for Desktop PC

Code No.: ZMES18076017

Make	**:**	**HP/Dell Desktop PC**
Operating System	**:**	**Generic Window Vista (R) ultimate SP1**
Processor	**:**	**Intel Core 2 Quad Processor Q9300**
Memory	**:**	**4 GB Dual Channel DDR2 800MHz SDRAM**
Hard Disk Drive	**:**	**500 GB SATA II 3.0 Gb/S**
Optical Devices	**:**	**Dual devices 16 x DVD ROM & 16 x DVD +/- RW with Dual Layer (SATA)**
Networking	**:**	**Integrated 10/100 Ethernet**
Video	**:**	**n Video (R) Geforce (R) 8800 GT 512MD DRR3**
Monitor	**:**	**19" Wide Screen Flat Panel LCD Monitor**
Speakers	**:**	**Stereo speakers with sub woofer**
Keyboard	**:**	**USB Enhanced Multimedia Keyboard**
Mouse	**:**	**Optical Mouse (USB)**
Ports	**:**	**1 Serial, 1 Parallel, 4 USB 2.0, 19 in 1 High speed Media Card Reader**
Printer	**:**	**HP Printer Model No.LJP 2015 or equivalent of HP make with one extra cartridge**
Cable	**:**	**Cable for connecting instrument to PC**

REMARKS:

- **Original CD(s) of the Operating System (OS) must be provided (not preloaded).**
- **Hard Disk Drive (HDD) must have minimum 4 partitions.**
- **Product offered, must conform to the minimum requirements as detailed above.**
- **Products with specifications exceeding the minimum requirements will be technically acceptable.**

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Specification for Inserts

Code No.: ZMES18076017

1.	INSERT,A,AL-Bronze ,MISC HLS
2.	INSERT,B, AL-Bronze ,CMP HLS
3.	INSERT,C, AL-Bronze ,FOUR 0.25 IN HLS
4.	INSERT,D, AL-Bronze ,METRIC MISC HLS
5.	INSERT,E, AL-Bronze,METRIC,0.25 IN REF,MISC HLS
6.	INSERT,F, AL-Bronze, METRIC,0.25 IN REF,CMP HLS
7.	INSERT,G, AL-Bronze , EA TEST
8.	INSERT, AL-Bronze T, , CALIBRATION TEST
9.	INSERT, BLANK, AL-Bronze

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Annexure – G

Specification for Software

Code No.: ZMES18076017

1. Fully Automated calibration software for calibration of RTDs, thermocouples, thermometers and many heat sources and able to perform coefficient calculations and generals tables and reports conforming to international standard.
2. Software for controlling metrology wells.
3. Software for multiple channel logging of data from thermometer readout.

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