

Laboratory	Central Instrumentation Laboratory, Essar Steel India Ltd., 27 km Surat Hazira Road, Hazira, Surat, Gujarat		
Accreditation Standard	ISO/IEC 17025: 2005		
Discipline	Electro-Technical Calibration	Issue Date	22.09.2016
Certificate Number	C-0659	Valid Until	21.09.2018
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Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (\pm)	Remarks
<u>SOURCE</u>			
1. AC VOLTAGE^{\$}	50 Hz 2 mV to 300 V 300V to 750V	2.93% to 0.06% 0.06% to 0.1%	Using Multi-Product Calibrator Fluke Model 9100 by Direct Method
2. DC VOLTAGE^{\$}	1mV to 100mV 100mV to 1000V	5.77% to 0.09% 0.09% to 0.06%	Using Multi-Product Calibrator Fluke Model 9100 by Direct Method
3. DC VOLTAGE[*]	1 mV to 11 V	0.98 % to 0.07 %	Using Beamax MC 2 by Direct Method
4. AC CURRENT^{\$}	50 Hz 0.1mA to 3A 3A to 10A 10A to 800A	0.22% to 0.17% 0.17% 0.08% to 2.35%	Using Multi-Product Calibrator Fluke Model 9100 by Direct Method With Current Coil
5. DC CURRENT^{\$}	0.1mA to 3A 3A to 10A 10A to 1000A	0.07% to 0.08% 0.08% to 2.5% 0.08% to 2.5%	Using Multi-Product Calibrator Fluke Model 9100 by Direct Method With Current Coil
6. RESISTANCE^{\$}	1 Ω to 400 Ω 400 Ω to 100M Ω	5.83% to 0.02% 0.02% to 0.4%	Using Multi-Product Calibrator Fluke Model 9100 by Direct Method

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	Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (\pm)	Remarks
7.	RESISTANCE*	1 Ω to 4000 Ω	1.36 % to 1.88 %	Using Beamax MC 2 by Direct Method
8.	CAPACITANCE^s	1 nF to 1 μ F 1 μ F to 1 mF	0.87% to 0.08% 0.08% to 5.78%	Using Multi-Product Calibrator Fluke Model 9100 by Direct Method
9.	FREQUENCY^s	5 V 10Hz to 10 kHz 10kHz to 10MHz	0.06% to 0.58% 0.58%	Using Multi-Product Calibrator Fluke Model 9100 by Direct Method
10.	TEMPERATURE SIMULATION^s (Indicator/ Controller/ Recorder/ Calibrator)			
	J TYPE	(-) 210 $^{\circ}$ C to 1200 $^{\circ}$ C	0.64 $^{\circ}$ C	Using Multi-Product Calibrator Fluke Model 9100 by Direct Method
	K TYPE	(-) 200 $^{\circ}$ C to 1350 $^{\circ}$ C	0.71 $^{\circ}$ C	
	S TYPE	150 $^{\circ}$ C to 1750 $^{\circ}$ C	1.63 $^{\circ}$ C	
	B TYPE	600 $^{\circ}$ C to 1800 $^{\circ}$ C	1.63 $^{\circ}$ C	
	C TYPE	500 $^{\circ}$ C to 1700 $^{\circ}$ C	2.08 $^{\circ}$ C	
	N TYPE	(-) 200 $^{\circ}$ C to 1300 $^{\circ}$ C	0.82 $^{\circ}$ C	
	R TYPE	150 $^{\circ}$ C to 1700 $^{\circ}$ C	1.57 $^{\circ}$ C	
	T TYPE	(-) 250 $^{\circ}$ C to 400 $^{\circ}$ C	0.35 $^{\circ}$ C	
	E TYPE	(-) 200 $^{\circ}$ C to 1000 $^{\circ}$ C	0.64 $^{\circ}$ C	
	L TYPE	(-) 200 $^{\circ}$ C to 900 $^{\circ}$ C	0.81 $^{\circ}$ C	
	RTD PT-100 (4-wire & 2 Wire)	200 $^{\circ}$ C to 800 $^{\circ}$ C	0.44 $^{\circ}$ C	

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11. TEMPERATURE SIMULATION* (Indicator/ Controller/ Recorder/ Calibrator)			
J TYPE	(-) 200 °C to 1200 °C	0.85 °C	Using Beamax MC 2 by Direct Method
K TYPE	(-) 200 °C to 1350 °C	0.95 °C	
S TYPE	300 °C to 1750 °C	0.98 °C	
R TYPE	300 °C to 1750 °C	0.93 °C	
RTD PT-100 (4-wire)	(-) 200 °C to 800 °C	0.60 °C	
<u>MEASURE</u>			
1. AC VOLTAGE^{\$}	50Hz 2mV to 100mV 100mV to 750V	1.79% to 0.05% 0.05% to 0.37%	Using 6 1/2 DMM by Direct Method
2. DC VOLTAGE^{\$}	1mV to 100mV 100mV to 1000 V	0.37% to 0.06% 0.06% to 0.07%	Using 6 1/2 DMM by Direct Method
3. AC CURRENT^{\$}	50Hz 0.1A to 3A	0.58% to 1.13%	Using 6 1/2 DMM by Direct Method
4. DC CURRENT^{\$}	0.1A to 3A	1.16% to 0.16%	Using 6 1/2 DMM by Direct Method
5. RESISTANCE^{\$}	1 Ω to 100 Ω 100 Ω to 100M Ω	1.45% to 0.58% 0.58% to 0.43%	Using 6 1/2 DMM by Direct Method

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	Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (±)	Remarks
6.	FREQUENCY[§]	100 mV to 750V 10 Hz to 300 kHz	0.06%	Using 6 1/2 DMM by Direct Method
7.	TEMPERATURE SIMULATION[§] (Indicator/ Controller/ Recorder/ Calibrator) THERMOCOUPLE			
	E TYPE	(-) 200 °C to 950 °C	0.65 °C	Using 6 1/2 DMM by Direct Method
	J TYPE	210 °C to 1000 °C	0.70 °C to 0.92 °C	
	K TYPE	200 °C to 1300 °C	0.79 °C to 0.99 °C	
	N TYPE	200 °C to 1300 °C	0.81 °C to 1.03 °C	
	R TYPE	(-)45 °C to 1700 °C	0.60 °C to 1.03 °C	
	S TYPE	(-)45 °C to 1750 °C	1.41 °C to 1.63 °C	
	T TYPE	200 °C to 350 °C	0.63 °C	
	RTD (PT-100) 4-wire & 2 Wire	(-) 200 °C to 800 °C	0.45 °C	
8.	TEMPERATURE SIMULATION[*] (Indicator/ Controller/ Recorder/ Calibrator) THERMOCOUPLE			
	J TYPE	(-) 200 °C to 1200 °C	0.42 °C to 1.05°C	Using Beamax MC 2 by Direct Method
	K TYPE	(-)200 °C to 1200 °C	1.05°C	
	S TYPE	150 °C to 1750 °C	1.95°C	
	R TYPE	150 °C to 1750 °C	1.91°C	
	RTD (PT-100)	(-) 200 °C to 800 °C	0.46 °C	

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	Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (\pm)	Remarks
9.	DC VOLTAGE*	1 mV to 30 V	0.86 % to 0.04 %	Using Beamax MC 2 by Direct Method
10.	DC CURRENT*	1 mA to 100 mA	0.09 %	Using Beamax MC 2 by Direct Method
11.	RESISTANCE*	1 Ω to 4000 Ω	6.12 % to 0.97 %	Using Beamax MC 2 by Direct Method

* Measurement Capability is expressed as an uncertainty (\pm) at a confidence probability of 95%.

§ Only in Permanent Laboratory

* Only for Site Calibration

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