EVALUATION OF MEASUREMENT UNCERTAINTY

1. COMPANY NAME : Sri Balaji Castings **DATE :** 16-02-2024

2. DEVICE UNDER CALIBRATION : Snap Gauge

Range (mm) : 35	**Resolution (mm) :** 0.001	**Coefficient of Thermal Expansion (DUC)-(αD)(mm/m°C) :** 0.0115

3. STANDARDS / EQUIPMENT USED FOR CALIBRATION :

Sr.No	Master Name	Range/Size (mm)	L.C. (mm)	Uncertainty (mm)	Accuracy (mm)	Material
Master 1	Digital Vernier Caliper - SBC/DVC/32	0-200	0.01	0.001	0.001	Steel

4. ENVIRONMENTAL PARAMETERS

Start Temp T1 (°C)	End Temp T2 (°C)	Mean Temp (TA= (T1+T2)/2)	Ref. Temp (TR)	Thermal Expansion of master (mm/m°C)(αM)	Thermal Expansion of DUC (mm/m°C)(αD)	Uncertainty of Temperature Indicator (°C) UT (±)
20	21	20.50	20	0.0115	0.0115	0.3

5. REPEATABILITY (mm)

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	Standard Deviation	n
30.522	30.523	30.522	30.524	30.524	-	-	-	-	-	0.0010	5

6. UNCERTAINTY BUDGET

Source of uncertainty Xi		Estimates (Xi)	Probability Distribution	Type	Factor (x)	Standard Uncertainty u = (Xi / x)	Sensitivity Coefficient (y)	Uncertainty contribution ui = (x * y)	Degree of freedom vi = (n - 1)
U1	Uncertainty due to Calibration of Master 1 mentioned in the certificate	0.0010	Normal	Type B	2	0.0005	1	0.0005	∞
U2	Uncertainty due to accuracy of Master 1	0.0010	Rect	Type B	√3	0.0006	1	0.0006	∞
U3	Uncertainity due to Least count of Master 1	0.0050	Rect	Type B	√3	0.0029	1	0.0029	∞
U4	Standard Unc due to deviation from reference temperature	0.5000	Rect	Type B	√3	0.2887	0.0004	0.0001	∞
U5	Standard Unc due to temperature difference between DUC and Master	0.1000	Rect	Type B	√3	0.0577	0.0004	0.0000	∞
U6	Standard Unc due to difference in thermal expansion coefficient of Master (10%)	0.0011	Rect	Type B	√3	0.0006	0.0175	0.0000	∞
U7	Standard Unc due to difference in thermal expansion coefficient of DUC (10%)	0.0011	Rect	Type B	√3	0.0006	0.0175	0.0000	∞
U8	Standard Unc due to uncertainty of temperature monitoring System	0.3	Normal	Type B	2	0.1500	0.0004	0.0001	∞
U9	Standard Unc due to repeatability	0.0010	Normal	Type A	√5	0.0004	1	0.0004	4

Combined Uncertainty (Uc) : 0.0030 mm **Coverge Factor** (k) : 2 **Degree of freedom** (veff): 12657

Expanded Uncertainty (U): ± 0.0060 mm

Metric

Prepared By