

Mitutoyo Gauge Blocks and Inspection Certificates

A Certificate of Inspection is furnished with all Mitutoyo gauge blocks with a serial number on the box (in the case of sets) and an identification number on each block. The deviation of each block from nominal length, at the time of inspection, is stated. For this inspection, each gauge block is measured relative to the upper level master using a gauge block comparator.



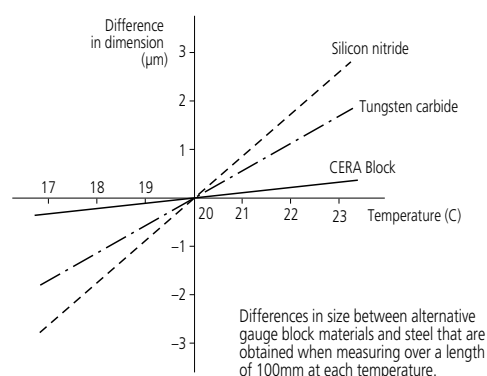
8. Characteristics of CERA Blocks Compared with other Gauge Block Materials

Property	Material			
	CERA Block (ZrO ₂)	Steel (Fe)	Tungsten Carbide (WC-Co)	Silicon nitride (Si ₃ N ₄)
Hardness (HV)	1350	800	1650	1500
Coefficient of thermal expansion (10 ⁻⁶ /K)	9.3±0.5	10.8±0.5	5.5±1.0	2
Flexural strength by 3-point bending (MPa)	1270	1960	1960	580
Fracture toughness K1c (MPa•m ^{1/2})	7	120	12	6.5
Young's modulus x10 ⁻⁴ (MPa)	20.6	20.6	61.8	28.4
Poisson's ratio	0.3	0.3	0.2	0.3
Specific gravity	6.0	7.8	14.8	3.2
Thermal conductivity (W/m•k)	2.9	54.4	79.5	16.7

Note: Ceramics have the advantage of a slow response to temperature changes due to the low thermal conductivity. However, caution is required when using CERA blocks in an environment subject to rapid temperature change.

9. Closest Expansion Coefficient to Steel

The thermal expansion coefficient of a CERA Block is quite similar to that of a steel gauge block.



10. Highly Resistant to Impact Damage

The CERA Block material is one of the toughest ceramics. It is extremely difficult to crack a CERA block in normal use.

ACCURACY SPECIFICATIONS: BS 4311: Part 1: 1993 (UK)

Inch						
Grade*		Nominal length (inch)				
		over 0 up to 0.4	over 0.4 up to 1	over 1 up to 2	over 2 up to 3	over 3 up to 4
0	Tolerance on deviation of measured central length	±5 μin	±6 μin	±8 μin	±10 μin	±12 μin
	Parallelism	4 μin			5 μin	
	Flatness	4 μin				
1	Tolerance on deviation of measured central length	±10 μin	±12 μin	±15 μin	±20 μin	±25 μin
	Parallelism	6 μin		7 μin		8 μin
	Flatness	6 μin				
2	Tolerance on deviation of measured central length	±20 μin	±25 μin	±30 μin	±40 μin	±50 μin
	Parallelism	12 μin			14 μin	
	Flatness	10 μin				
Metric						
Grade*		Nominal length (mm)				
		over 0 up to 10	over 10 up to 25	over 25 up to 50	over 50 up to 75	over 75 up to 100
0	Tolerance on deviation of measured central length	±0.12 μm	±0.15 μm	±0.2 μm	±0.25 μm	±0.3 μm
	Parallelism	0.1 μm			0.12 μm	
	Flatness	0.1 μm				
1	Tolerance on deviation of measured central length	±0.25 μm	±0.3 μm	±0.4 μm	±0.5 μm	±0.6 μm
	Parallelism	0.16 μm		0.18 μm		0.2 μm
	Flatness	0.15 μm				
2	Tolerance on deviation of measured central length	±0.5 μm	±0.6 μm	±0.8 μm	±1.0 μm	±1.2 μm
	Parallelism	0.3 μm			0.35 μm	
	Flatness	0.25 μm				

* At 20°C