



# CDGM Glass Company, USA

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## Borosilicate

### H-PZ33 Low Expansion Glass

H-PZ33 is a low expansion borosilicate glass characterized by high light transmittance, excellent thermal stability, excellent mechanical hardness, and excellent chemical durability. H-PZ33 has become the glass of choice for MR11 reflectors, MR16 reflectors, UHP lamps, parabolic aluminized reflectors, telescope mirrors, and any application where a low coefficient of thermal expansion is called for.

H-PZ33 Physiochemical Properties	
Refractive index (nd)	1.47200
Dispersion ( $n_F - n_C$ )	0.00719
Coefficient of Linear thermal expansion ( $\times 10^{-6}/^{\circ}\text{C}$ )	3.25
Thermal conductivity ( $\text{W}/(\text{m} \cdot ^{\circ}\text{C})$ )	1.14
Average thermal capacity ( $\text{KJ}/(\text{kg} \cdot ^{\circ}\text{C})$ )	0.83
Maximal operation temperature ( $^{\circ}\text{C}$ )	
Short Term	500
Long Term	450
Thermal stability	375
Density ( $\text{g}/\text{cm}^3$ )	2.23
Elastic modulus E ( $\text{kN}/\text{mm}^2$ )	64
Hardness (HK)	480
Poisson's Ratio	0.2
Climatic resistance (ISO - 719 - HGB)	Grade 1
Acid resistance	Grade 1
Alkali resistance	Grade 1
Melting temperature ( $^{\circ}\text{C}$ )	1680
Working Point ( $^{\circ}\text{C}$ )	1252
Softening Point ( $^{\circ}\text{C}$ )	$820 \pm 10$
Annealing Point ( $^{\circ}\text{C}$ )	$560 \pm 10$
Stress Point ( $^{\circ}\text{C}$ )	$510 \pm 10$
Surface Tension ( $\text{dyn}/\text{cm}$ )	340-350 (1252 $^{\circ}\text{C}$ )
Dielectric constant (1MHz, 20 $^{\circ}\text{C}$ )	4.6
Dielectric loss (1MHz, 20 $^{\circ}\text{C}$ )	$37 \times 10^{-4}$
Dielectric strength (50MHz, 25 $^{\circ}\text{C}$ ) Kv/mm	16
Color Code ( $\lambda 5/\lambda 80$ )	297.6/337.2
Volume Sensitivity (log $\rho$ )	
250 $^{\circ}\text{C}$	8.0
350 $^{\circ}\text{C}$	6.5
Environmental Protection	Pb < 50 ppm As < 5 ppm Cd < 5 ppm



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