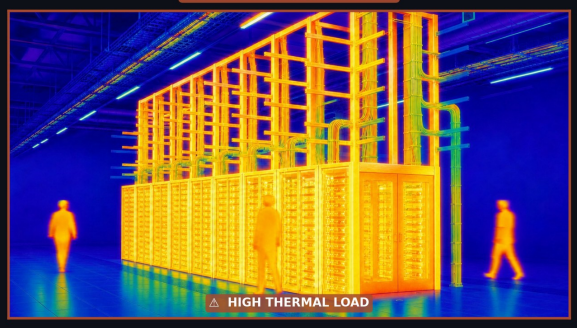
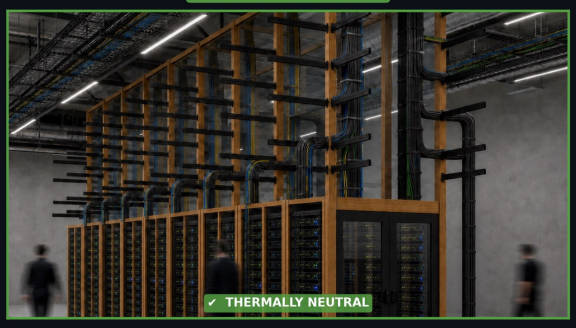
THERMAL PERFORMANCE COMPARISON

Structural Engineered Bamboo (SEB) vs. Aluminum · Server Rack & Hot-Aisle Containment Wall Systems · LoüTeq, LLC

ALUMINUM RACK SYSTEM



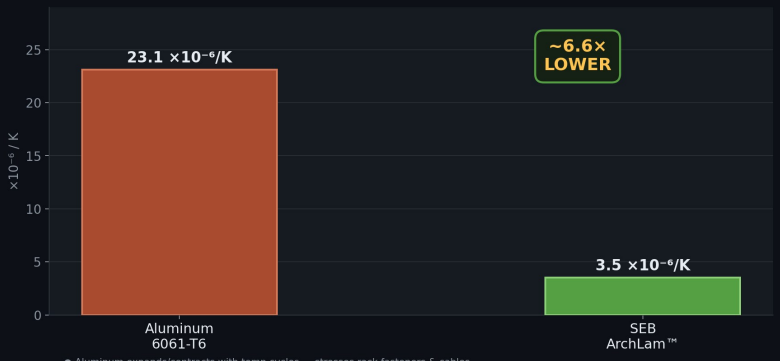
SEB ArchLam™ SYSTEM



Thermal Conductivity (W/m·K) — Log Scale

- Aluminum spreads server heat across the entire rack frame
- SEB acts as a thermal break — heat stays at the source

Coefficient of Thermal Expansion (×10⁻⁶ / K)



- Aluminum expands/contracts with temp cycles — stresses rack fasteners & cables
- SEB's near-dimensional stability eliminates thermal fatigue in HAC wall panels

FULL MATERIAL PROPERTY SUMMARY · DATA CENTER APPLICATIONS

Property	Aluminum 6061-T6	SEB ArchLam™	Advantage	Aluminum — Risk	SEB — Benefit
Thermal Conductivity	167 W/m·K	~0.17 W/m·K	**~982×**	Heat floods entire rack frame	Acts as thermal break in rack
Thermal Expansion (CTE)	23.1 ×10⁻⁶/K	~3.5 ×10⁻⁶/K	**~6.6×**	Fatigue at fasteners & joints	Dimensionally stable in HAC walls
Thermal Resistance	Negligible (k≈167)	High (k≈0.17)	—	Frame conducts heat to cold aisle	Insulates & preserves cold zone
Specific Heat Capacity	0.90 kJ/kg·K	~1.5 kJ/kg·K	**~1.7×**	Rapid temp swings amplify hotspots	Higher thermal mass buffers spikes
EMF / RF Coupling	Conductive metal	Non-conductive	—	Rack frame acts as RF antenna	Zero EM coupling to structure
Embodied Carbon	~8 kg CO_2/kg	<0.5 kg CO_2/kg	**>16×**	High smelting emissions	Carbon-sequestering renewable

Sources: NIST / MatWeb (Al 6061-T6) · Shah et al., J. Mat. Sci. 2015 (engineered bamboo thermal conductivity) · Thermtest 2024 (bamboo composite data) · Engineering Toolbox (CTE) · SEB values reflect ArchLam™ parallel-grain orientation.