

Thermal Expansion Report for WPC Profile
(12 ft and 16 ft lengths, -20°C to +60°C)

Assumptions:

- Material: Wood-Plastic Composite (WPC)
- Coefficient of linear thermal expansion: $\alpha = 4 \times 10^{-5} \text{ } 1/^{\circ}\text{C}$
- Reference temperature: 20°C
- Nominal lengths at 20°C: 12 ft = 3657.6 mm, 16 ft = 4876.8 mm

Table 1 – Expected Length vs. Temperature (along the profile length):

Temp (°C)	ΔT (°C)	12 ft length (mm)	ΔL 12 ft (mm)	ΔL 12 ft (in)	16 ft length (mm)	ΔL 16 ft (mm)	ΔL 16 ft (in)
-20	-40	3651.7	-5.9	-0.23	4869.0	-7.8	-0.31
0	-20	3654.7	-2.9	-0.12	4872.9	-3.9	-0.15
20	0	3657.6	0.0	0.0	4876.8	0.0	0.0
40	20	3660.5	2.9	0.12	4880.7	3.9	0.15
60	40	3663.5	5.9	0.23	4884.6	7.8	0.31

Notes:

- Values are approximate and based on a typical WPC thermal expansion coefficient.
- Over the full range -20°C to +60°C (ΔT = 80°C), total movement is about 11.7 mm (~0.46 in) for 12 ft and 15.6 mm (~0.61 in) for 16 ft.
- Allow at least this much free space for expansion/contraction at end joints and fixed points, plus a safety margin.