



Technical Bulletin

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MW# 148-210201

Topic: Thermal Movement and Sealant Calculations

Sealant joints in a building need to be sized for anticipated movement. Anticipating the movement of a sealant joint is usually based upon scientific formulas tempered with the design professional’s expertise. Master Wall does suggest sealant joint sizes, but ultimately the sealant joint size and design is the responsibility of a design professional or architect.

When materials are heated or cooled, their length changes by an amount proportional to the original length and temperature change. The amount can be calculated by the following equation:

$$\Delta L = \delta * L * \Delta T$$

ΔL =The change in length

δ =The coefficient of thermal expansion (see chart)

L=The length of the panel or dissimilar material

ΔT =Change in temperature*

*Change in temperature can vary from simply using weather data to anticipating the effect of dark colors with high solar gain.

Expansion Coefficients

Galvanized Steel/Steel

0.0000067 of an inch/inch/degree Fahrenheit

Stainless Steel

0.0000096 of an inch/inch/degree Fahrenheit

Aluminum

0.0000129 of an inch/inch/degree Fahrenheit

Vinyl Siding

0.000031 to 0.000036 of an inch/inch/degree Fahrenheit

PVC Plastic

0.000028 of an inch/inch/degree Fahrenheit

Brick Masonry

0.0000034 of an inch/inch/degree Fahrenheit

Stucco

0.0000070 of an inch/inch/degree Fahrenheit

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Example 1

Anticipate the movement of a white, 8' x 8' aluminum clad window, in a moderate climate (15°F winter, 110°F summer, 95° range)

$0.0000129 * (8' * 12''/ft) * 95^\circ = 0.12''$, or about 1/16" each side

Example 2

Anticipate the movement of a dark bronze aluminum clad ribbon window, 4' tall by 30' long, in a cold climate (0°F winter, 100°F summer, 100° range). As the designer, you may want to allow for the anticipated solar gain of a dark color, which can be as high as 180°F, 160°F is shown in the example.

$0.0000129 * (30' * 12''/ft) * 160^\circ = 0.74''$, or about 3/8" each side

Historical weather data may be available locally, in the most recent versions of the building codes (IBC, IRC) or from ASHRAE publication 4580 (RP-1171) -- Estimation of U.S. Design Temperatures Using Daily Maximum and Minimum Temperatures (<http://resourcecenter.ashrae.org/>). More information on designing sealant joints will be in the next Technical Bulletin

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