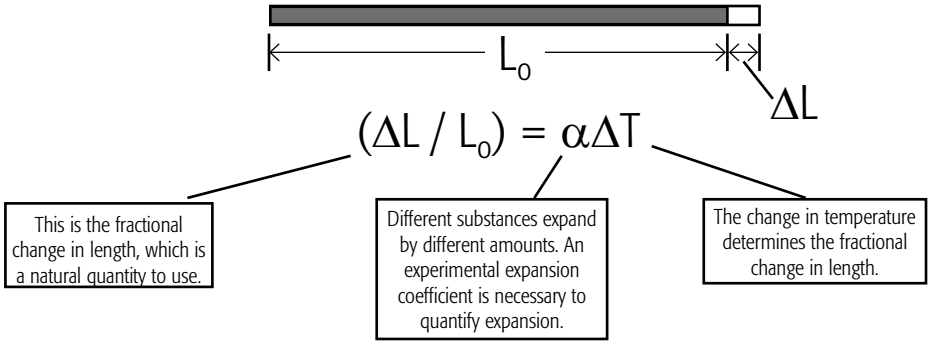
Coefficient of Thermal Linear Expansion for KYDEX® Sheet

For information applicable to KYDEX® FST please refer to 300 series technical briefs.

TB - 121-C

Introduction

During heat transfer, the energy that is stored in the intermolecular bonds between atoms changes. When the stored energy increases, so does the length of the molecular bond. As a result, solids expand in response to heating and contract on cooling; this response to temperature change is expressed as its coefficient of thermal expansion. The linear thermal expansion coefficient relates the change in temperature to the change in a material's linear dimensions. It is the fractional change in length of a bar per degree of temperature change.



Test Method

Testing for the coefficient of linear thermal expansion is best described by ASTM 696. This test method is intended to provide a means of determining the coefficient of linear thermal expansion of plastics by using temperature extremes to change molecular energy within the material.

Example:

The linear thermal expansion of a 4′ X 8′ sheet of KYDEX® 100 from 30°F to 70°F can be found by using the linear thermal expansion equation. Linear thermal expansion is comprised of three basic things; change in temperature, original length, and coefficient of linear thermal expansion. In this case KYDEX® 100 is the material being used and its coefficient of linear thermal expansion may be found from the chart listed below ($4.15*10^{-5}$). The following is a set-up to find the final dimension of the 8′ sheet at 70°F.

$\Delta L = L_0*(\alpha*\Delta t)$

ΔL = Change in length

L_0 = Initial length (96″)

α = Coefficient of linear thermal expansion

Δt = Change in temperature (40°F)

$\Delta L = 96″*((4.15*10^{-5}$ in/in/°F)* 40°F)

$\Delta L = 0.15936″$

$L_0 + \Delta L = Lf$

96″ + 0.15936″ = 96.15936″

The final length of the KYDEX® 100 8′ sheet is just barely over 8′ at 70°F, but the change in length is still noticeable and needs to be considered when installing the sheet. Without factoring in linear thermal expansion many problems may occur after installation due to fluctuations in temperature.

SEKISUI SPI
ISO 9001 and 14001 Certified

Customer Service
6685 Low St, Bloomsburg, PA 17815 USA
Phone: 800.325.3133, +1.570.389.5810
Outside the US: +1.570.389.5814
Fax: 800.452.0155, +1.570.387.7786
Email: info@sekisui-spi.com

Technical Service
Phone: 800.682.8758
Fax: +1.570.387.8722
Outside the US: +1.570.387.6997
techservice@sekisui-spi.com

sekisui-spi.com

KYDEX THERMOPLASTICS

Coefficient of Thermal Linear Expansion for KYDEX® Sheet

For information applicable to KYDEX® FST please refer to 300 series technical briefs.

TB - 121-C

Linear Expansion Values by Product

Coefficient of Thermal Linear Expansion				
Product	Machine Direction (in/in)/°F	Machine Direction (mm/mm)/°C	Transverse Direction (in/in)/°F	Transverse Direction (mm/mm)/°C
KYDEX® 100	$4.15*10^{-5}$	$7.47*10^{-5}$	$4.67*10^{-5}$	$8.41*10^{-5}$
KYDEX® 311/311MB/312	$4.83*10^{-5}$	$8.70*10^{-5}$	$4.61*10^{-5}$	$8.29*10^{-5}$
KYDEX® 331/331d	$4.83*10^{-5}$	$8.70*10^{-5}$	$4.61*10^{-5}$	$8.29*10^{-5}$
KYDEX® 430	$4.14*10^{-5}$	$7.45*10^{-5}$	$4.14*10^{-5}$	$7.45*10^{-5}$
KYDEX® 5555/5555MB	$3.68*10^{-5}$	$6.63*10^{-5}$	$3.98*10^{-5}$	$7.16*10^{-5}$
KYDEX® 6200	$4.24*10^{-5}$	$7.64*10^{-5}$	$4.73*10^{-5}$	$8.51*10^{-5}$
KYDEX® 6503	$3.81*10^{-5}$	$6.85*10^{-5}$	$3.98*10^{-5}$	$7.16*10^{-5}$

For further information on thermal expansion and a thermal expansion calculator, visit:
http://hyperphysics.phy-astr.gsu.edu/hbase/thermo/thexp.html

SEKISUI SPI
ISO 9001 and 14001 Certified

Customer Service
6685 Low St, Bloomsburg, PA 17815 USA
Phone: 800.325.3133, +1.570.389.5810
Outside the US: +1.570.389.5814
Fax: 800.452.0155, +1.570.387.7786
Email: info@sekisui-spi.com

Technical Service
Phone: 800.682.8758
Fax: +1.570.387.8722
Outside the US: +1.570.387.6997
techservice@sekisui-spi.com

sekisui-spi.com

This information supersedes all previously published data.