

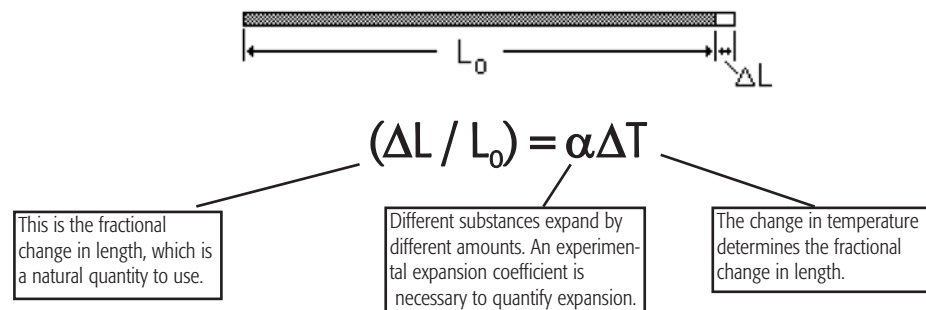
Coefficient of Thermal Linear Expansion for KYDEX[®] Sheet

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

TB - 124

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 (4.2×10^{-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)

$$\Delta L = 96'' * ((4.2 * 10^{-5} \text{ in/in/}^\circ\text{F}) * 40^\circ\text{F})$$

$$\Delta L = 0.16128''$$

$$L_0 + \Delta L = L_f$$

$$96'' + 0.16128'' = 96.16128''$$

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.

KYDEX[®]

ISO 9001:2000 | ISO 14001:2004 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@kydex.com

Technical Service

Phone: 800.682.8758 ext. 581
Fax: +1.570.387.8722
Outside the US: +1.570.387.6997 ext. 581

www.kydex.com

Coefficient of Thermal Linear Expansion for KYDEX[®] Sheet

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

TB - 124

Linear Expansion Values by Product

Measures the ability of the surface to resist staining by substances that may be encountered in common household service. Samples are exposed to 29 different substances for 16 to 24 hours. A cleaning procedure is followed, and the effect of each staining substance is determined. Effects are reported as having "No Effect," "Moderate Effect," or "Severe Effect." Materials that caused moderate or severe effects are reported.

Results: Reagents 1-5, 7-28, 30 No Effect, Reagents 6,29 Severe.

Product	Coefficient of Thermal Linear Expansion	
	(mm/mm)/°C	(in/in)/°F
KYDEX [®] 100	7.56*10 ⁻⁵	4.2*10 ⁻⁵
KYDEX [®] 154	7.56*10 ⁻⁵	4.2*10 ⁻⁵
KYDEX [®] 510	5.94*10 ⁻⁵	3.8*10 ⁻⁵
KYDEX [®] 6200	7.22*10 ⁻⁵	4.0*10 ⁻⁵
KYDEX [®] T	6.84*10 ⁻⁵	3.8*10 ⁻⁵
KYDEX [®] 115	7.56*10 ⁻⁵	4.2*10 ⁻⁵
KYDEX [®] 1900	6.14*10 ⁻⁵	3.4*10 ⁻⁵
KYDEX [®] 6565	7.12*10 ⁻⁵	4.0*10 ⁻⁵

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



ISO 9001:2000 | ISO 14001:2004 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@kydex.com

Technical Service

Phone: 800.682.8758 ext. 181
Fax: +1.570.387.8722
Outside the US: +1.570.387.6997 ext. 581

www.kydex.com

Because we cannot anticipate or control the many different conditions under which this information and our products may be used, we do not guarantee the applicability of the accuracy of this information or the suitability of our products in any given situation. Users should conduct their own tests to determine the suitability of each product for their particular purposes. Data in the physical property table represents typical values and are to serve only as a guide for engineering design. Results are obtained from specimens under ideal laboratory conditions. Right to change physical properties as a result of technical progress is reserved. THE PRODUCTS DISCUSSED ARE SOLD WITHOUT WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, EITHER EXPRESSED OR IMPLIED, EXCEPT AS PROVIDED IN OUR STANDARD TERMS AND CONDITIONS OF SALE. Buyer assumes all responsibility for loss or damage arising from the handling and use of our products, whether done in accordance with directions or not. In no event shall the supplier or the manufacturer be liable for incidental or consequential damages. Also, statements concerning the possible use of our products are not intended as recommendations to use our products in the infringement of any patent. Consult local code and regulatory agencies for specific requirements regarding code compliance, transporting, processing, recycling and disposal of our product. Product not intended for use as a heat resistant surface. Texture, product grade and other conditions may cause variations in appearance.

This information supersedes all previously published data.