



Coefficient of Linear Thermal Expansion (CLTE) for Elastomers

1 Scope

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose. This is a supplementary method to ASTM E831 *Linear Thermal Expansion of Solid Materials by Thermomechanical Analysis*, and contains only amended language. All other ASTM E831 content applies.

1.2 Foreword. This document further defines test specimen size, specimen molding and conditioning before testing, test probe conditions, etc., with details not in the current ASTM procedure. This specificity provides more consistency and reliability for this database characteristic.

1.3 Applicability. Part of the basic elastomer hyperelastic property database compound characterization. These conditions are intended for elastomers in the 50 to 85 Shore A range per ASTM D2240.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

ASTM A109

ASTM D2240

ASTM E831

2.2 GM Standards/Specifications.

None

3 Resources

3.1 Facilities. A suitable area or room for conducting testing with a stable and conditioned environment.

3.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.2 Alternatives. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

3.2 Equipment.

3.2.1 Thermomechanical Analysis Test Equipment. As defined in ASTM E831.

3.2.2 Specimen Mold (Figure 1). A multi-cavity (3) ASTM A109 1008/1010 cold roll tool steel mold for compression molding of test specimens. The top is not shown in Figure 1, but overall base dimensions are 50 mm x 63 mm x 20 mm thick and the cover is 3.2 mm thick. Outer ring around each cavity handles excess rubber from plug charge during molding. Specimens are removed using a high pressure hose with compressed air.

3.2.2.1 The press for molding the specimens shall be capable of exerting sufficient pressure on the cavities of the mold during the entire period of vulcanization. The platen shall be electrical or steam heated, and the set temperature uniformly distributed to the mold and cavities. Compressed air is the best method to remove the specimens, but care must be taken not to cool the small tool too rapidly. When molding multiple specimens, be sure the tool temperature has properly recovered before proceeding with the next mold cycle.



Figure 1: Three Cavity Specimen Mold

3.3 Test Vehicle/Test Piece. Specimen is a 5 mm x 5 mm x 5 mm cube compression molded from small plug charges inserted from the production compound mix into each cavity. The specimen side to opposite side surfaces shall be flat, smooth and parallel. The flatness and parallelism is achieved by the mold cavity using datum A. A very small radius is permitted at the top and bottom corners of the tool cavities. (See Figure 2.)

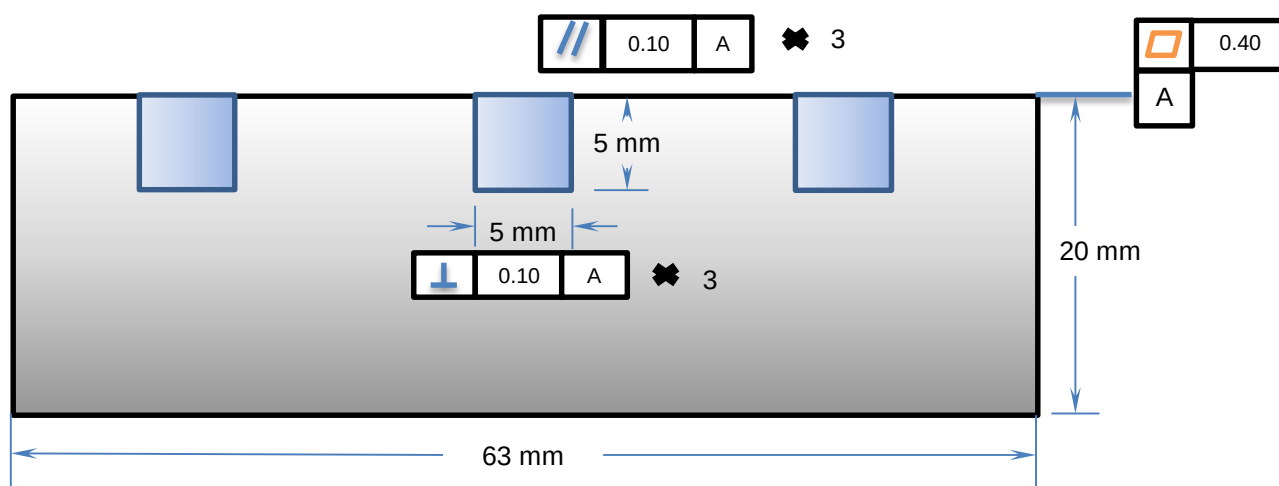


Figure 2: Tolerances of Specimen Mold (not to scale, no flash channel shown)

3.3.1 A lab mill mix may be used if the compound is new and under development. Otherwise the samples shall come from the production scale mixer and mill. Mold conditions shall represent those typical of a production gasket material including post curing if necessary. This information shall be provided in the test report.

3.4 Test Time. Test times don't include specimen molding and shipping.

Calendar time: 1.5 days

Test hours: 3 to 5 hours

Coordination hours: 24 hours

3.5 Test Required Information.

3.5.1 Assumptions.

3.5.1.1 This method assumes there is no anisotropy or grain directionality due to flow introduced during processing and preparation in the test specimens, so measuring in the x-, y- and z-axes is not necessary. Multiple axis measurement is by special request with each new surface plane marked as removed from the mold. Use only specimens from the same multi-cavity mold condition for multiple plane surface measurement.