Circumferential Extensometer Model 3544

Correcting for Specimen Diameter

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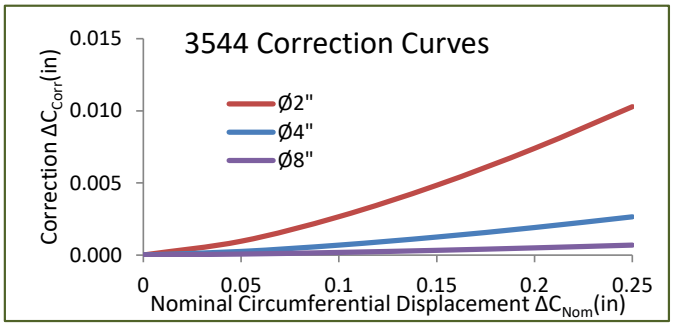
The output of *Circumferential Extensometer Model 3544* indicates $\Delta C_{Nominal}$, the nominal change in the *circumference*, as shown on the test certificate. Accuracy of the results using this instrument may be improved by applying a small correction ΔC_{Corr} based on the specimen diameter; it is typically less than 1% of reading and in most applications it may be neglected. An empirical correction is provided as follows:



$$C = \pi * D_{Init} + \Delta C_{Nom} + \Delta C_{Corr}$$

$$\Delta C_{Corr} = a * \Delta C_{Nom}^{1.4761}$$

$$a = 0.3074 * D_{Init}^{-1.9498} \quad \text{(inch units)}$$

$$a = 36.142 * D_{Init}^{-1.9498} \quad \text{(mm units)}$$

Example:

Initial Specimen Diameter: Ø4.00"

Nominal (Indicated) Circumferential Displacement ΔC_{Nom}: 0.200"

Solution:

$$a = 0.3074 * D_{Init}^{-1.9498} = 0.3074 * 4.0000^{-1.9498} = 0.0206$$

$$\Delta C_{Corr} = a * \Delta C_{Nom}^{1.4761} = 0.0206 * 0.2000^{1.4761} = 0.0019" \text{ (correction to be applied)}$$

$$C = \pi * D_{Init} + \Delta C_{Nom} + \Delta C_{Corr} = 4.0000\pi + 0.2000" + 0.0019" = 12.7683"$$

For the best accuracy, a correction should be made using the equations above. However, a generally suitable correction can also be obtained by employing a simple two-point correction. This may be done by adjusting the full scale reading of the 3544 when performing a two-point calibration as shown below.

Example:

Specimen Diameter: Ø4.00"

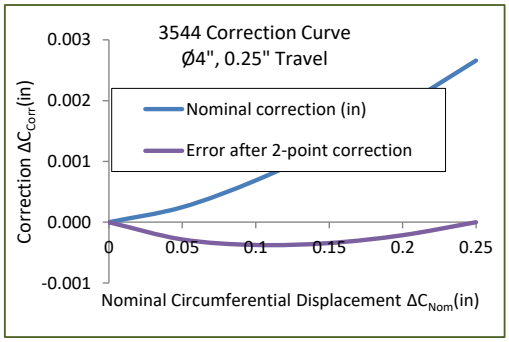
3544 Nominal Full Scale Range: 0.25"

Solution:

Correction at Full Scale: 0.0027"

Corrected Full Scale Range: 0.2527"

(use this during two-point calibration)



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