

# What are the Corrections Applied in Surveying?

For surveying, we need to have some prerequisite conditions. If these conditions are not met we can have a huge variation in result. Therefore we have to apply corrections to get the true result.

## Ideal Conditions

- 1) A tape accurate to 0.00305m or 0.01 ft should be used.
- 2) Tension of the tape should be about 66.7N or 15 lb.
- 3) Temperature should be determined within 5.56°C or 10°F
- 4) The slope of the ground, should be within 2 percent

On ground these are nearly impossible to achieve and thus corrections need to be applied.

## Corrections Applied for Temperature

The correction applied on steel tape is  $C_t = 0.000065s(T - T_0)$

where

$C_t$  = temperature correction to measured length, ft (m)

T = temperature at which measurements are made, F ( C)

$T_0$  = temperature at which tape is standardized, F ( C)

s = measured length, ft (m)

## Correction Applied to Measurements on Slope

$C_h = s (1 - \cos @)$  [exact]

or =  $0.00015s@^2$  [approximate]

or =  $h^2/2s$

where

$C_h$  = correction to be subtracted from slope distance, ft (m)

s = measured length, ft (m)

@ = slope angle, degree

h = difference in elevation at ends of measured length, ft (m)

## Correction Applied for Tension

$C_p = s[P_m - P_s]/SE$

## Correction Applied for Sag when not Fully Supported

$C_s = w^2L^3/24P_m^2$

where

$C_p$  = tension correction to measured length, ft (m)

$C_s$  = sag correction to measured length for each section of unsupported tape, ft (m)

$P_m$  actual tension, lb (N)

$P_s$  tension at which tape is standardized, lb (N) (usually 10 lb) (44.4 N)

$S$  = cross-sectional area of tape, in<sup>2</sup> (mm<sup>2</sup>)

$E$  = modulus of elasticity of tape, lb/in<sup>2</sup> (MPa) (29 million lb/in<sup>2</sup> (MPa) for steel)  
(199,955 MPa)

$w$  = weight of tape, lb/ft (kg/m)

$L$  = unsupported length, ft (m)

### **What are Slope Corrections?**

We know that the horizontal distance  $H = L \cos \theta$ , where  $L$  slope distance and  $\theta$  = vertical angle, measured from the horizontal.

For slopes of 10 percent or less

$$C_s = d^2 / 2L$$

For a slope greater than 10 percent

$$C_s = d^2 / 2L + d^4 / 8Ld^3$$

### **What are Temperature Corrections in terms of length?**

$$C_t = (\text{actual tape length} - \text{nominal tape length})L / \text{nominal tape length}$$

For nonstandard tension:

$$C_t = (\text{applied pull} - \text{standard tension})L / AE$$

where  $A$  = cross-sectional area of tape, in<sup>2</sup> (mm<sup>2</sup>)

$E$  = modulus of elasticity 29,000,000 lb / in<sup>2</sup> for steel (199,955 MPa).

For sag correction between points of support, ft (m):

$$C = -w^2 L_s^3 / 24P^2$$

where

$w$  = weight of tape per foot, lb (N)

$L_s$  = unsupported length of tape, ft (m)

$P$  = pull on tape, lb (N)

**Source:** <http://www.engineeringcivil.com/what-are-the-corrections-applied-in-surveying.html>