Braced Line Post Ratings
IEEE T&D

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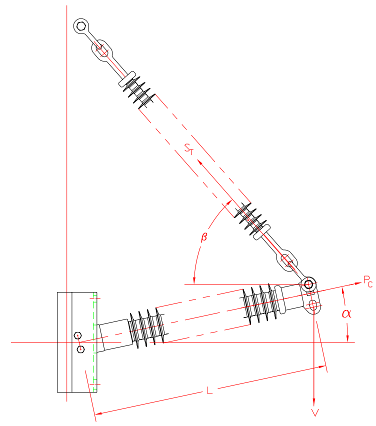
Why Use a Braced Line Post?

- **Line Compaction**
  - Fixed Conductor Position
  - Controlled Transverse Loading Swing
  - All achieved with a line post
- **Mechanical Capabilities**
  - Vertical Loading
    - Increased Over Standard Line Post
    - Based Upon Strength of Components
  - Longitudinal Loading – Based Upon Design
    - Pivoting Design – Tensile Rating of Post
    - BLP – Cantilever Rating of Post
  - Transverse – Based Upon Post

Braced Line Posts

$P_c \equiv$ Post compressive loading
$S_t \equiv$ Suspension tension loading
$\alpha \equiv$ Upsweep angle of post
(w/r to horizontal)
$\beta \equiv$ Suspension angle
(w/r to horizontal)
$V \equiv$ Vertical load to be sustained.

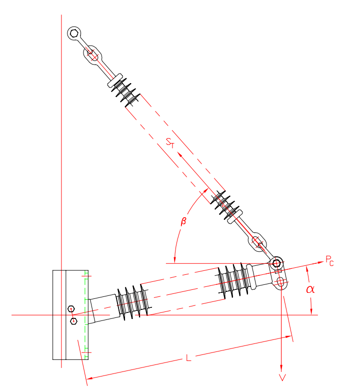


BRACED LINE POST

Calculations

$$V=S_t*\sin(\beta)+P_c*\sin(\alpha)$$

$$S_t*\cos(\beta)=P_c*\cos(\alpha)$$

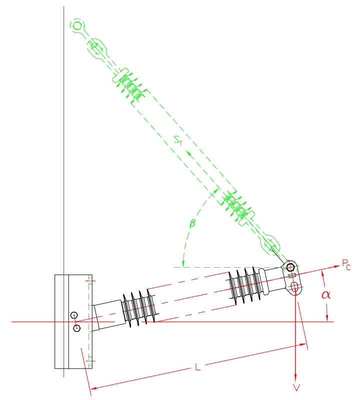


BRACED LINE POST

$$S_t=(V*\cos(\alpha))/((\cos(\alpha)*\tan(\beta)+\sin(\alpha))*\cos(\beta))$$

Considerations

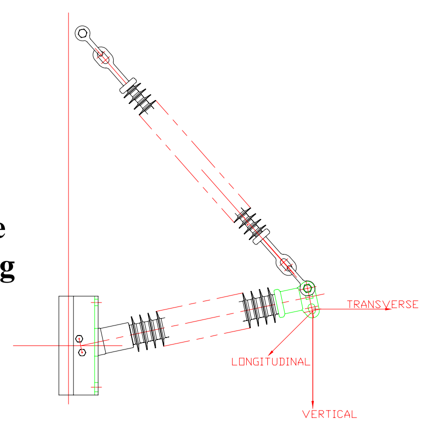
- **Suspension String Subassy.**
  - Rating of Suspension
  - Rating of Series Hardware
  - Rating of Post Attachment Hole
- **$S_T \leq$ Any of These.**



BRACED LINE POST

Considerations

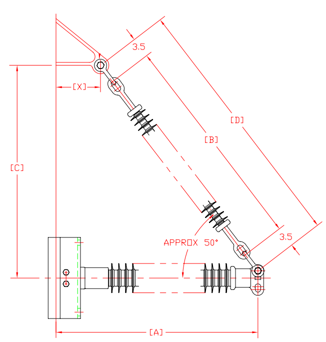
- **Line End Post Fitting**
  - Tension
  - Vertical
  - Longitudinal
- **Combined Magnitude of Loads ≤ Cap Rating**



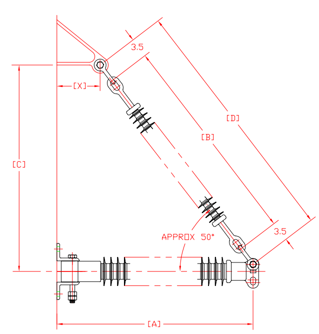
Considerations

- **Line Post Compression Loading**
- **$P_c = S_t$*cos(β)/ cos(α)**
- **Buckling Becomes an Issue – Compression loading on Column**
  - Euler's Buckling Equations
  - Buckling load= $\frac{\pi^2 * E * I}{k * l^2}$
- **Porcelain – Increase I**
- **Polymer – Work within Elastic Buckling Limit**
  - What is "k"?

Buckling Loads

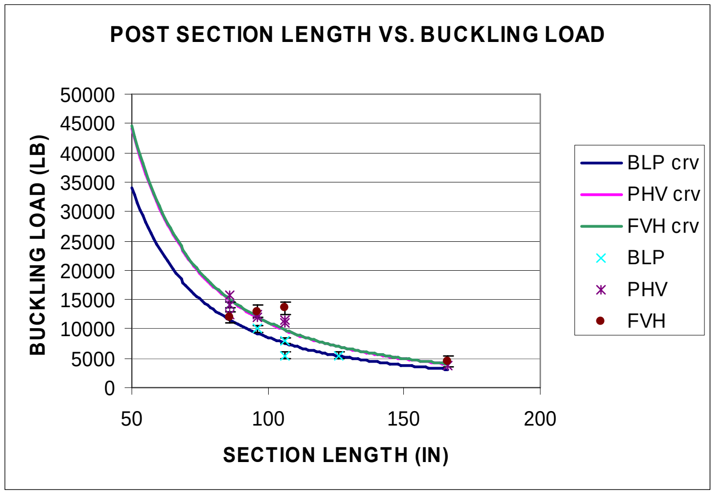


FIXED BASE HORIZONTAL-V



PIVOTING HORIZONTAL-V

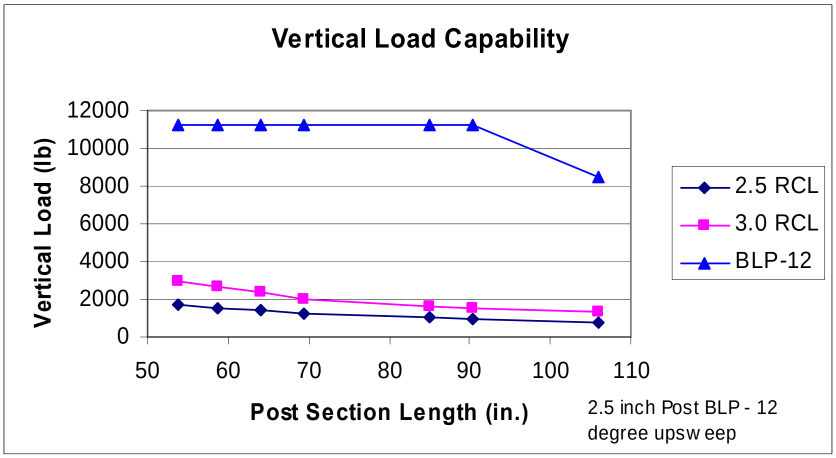
Measured Values



Fitted Curves

- **Braced Line Post**
  - Buckling load= $(\pi^2*E*I)/(1.33*L^2)$
- **Pivoting Horizontal Vee**
  - Buckling load= $(\pi^2*E*I)/(1.03*L^2)$
- **Fixed Base Horizontal Vee**
  - Buckling load= (π2*E*I)/(1.02*L2)

Vertical Capabilities



Questions?