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| EVERSOURCE | DISTRIBUTION SYSTEM ENGINEERING MANUAL |
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# PoleForeman Guidelines

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## 1.0 Introduction

1.1 This document provides applications details of when to use the PoleForeman line design program. PoleForeman shall be used when installing new or rebuilding overhead distribution lines and pole tops. This guideline applies to all operating companies and distribution system voltages, 35 kV and below.

## 2.0 Reference Documents

| | |
|---|---|
| DTR 06.025 | Guying – Determining Strength Requirements |
| DTR 07.011 | Structure Limits |
| DTR 04.047 | Attachment Points for Secondary and Neutral Cable |

## 3.0 Definitions

3.1 PoleForeman is used to evaluate pole loading, structural capacity, and associated attachments for overhead distribution construction.

3.2 Calculations ensure compliance with Eversource Construction Standards and confirm that poles, equipment, and support hardware meet required strength and sag criteria under applicable loading conditions.

3.3 PoleForeman incorporates all application structural components into the calculation, including:

3.3.1 Crossarms, pole-top pins, crossarm pins

3.3.2 Post, Vice-top, and dead-end insulators & hardware

3.3.3 Messenger, conductor brackets & hardware (Spacer Construction)

3.3.4 Wood, composite & steel poles

3.3.5 All guying materials

3.3.6 Communications cables and associated 3rd party hardware where applicable

3.4 Guy lead length is a critical factor in evaluating loading on a pole; shorter lead lengths increase vertical and horizontal loading. In ideal construction, an anchor installation 2/3 the lead-to-height ratio is ideal, but field conditions do not always allow for this.

3.4.1 The relationship between lead and height is illustrated in Figure 1. This table shows the effect of lead-to-height ratio on required guy strength. Refer to **DTR 06.025** Guying – Determining Strength Requirements for additional guidance.

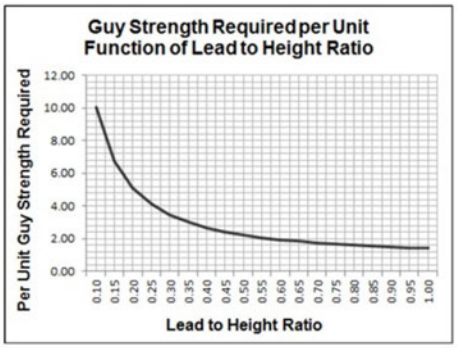


**Figure 1 – Guy Strength VS Lead-to-Height Ratio**

## 4.0 Program Usage Guidelines

4.1 Tangent & Light Angle Construction

4.1.1 For tangent and light-angle construction that complies with Eversource Construction Standards (refer **DTR 07.011**), a PoleForeman calculation is not required if span lengths are 200 feet or less and all guying and conductor-attachment requirements are satisfied. This exemption applies to crossarm, spacer cable, aerial cable, or multi-circuit construction types.

4.2 Pre-run calculations supporting these conditions are provided in Appendix A.

4.2.1 Pole loading analysis is sensitive to numerous variables. Any construction detail or field condition deviating from standard design assumptions can significantly influence calculated loading.

.1.1. All sample calculations in Appendix A were developed using less than ideal field conditions for each construction type, including maximum allowable light angles and shortened guy lead lengths. A full list of assumptions and input parameters is provided in the Appendix.

4.3 Construction Conditions requiring PoleForeman Calculations

4.3.1 A Pole Foreman calculation is required when:

.1.1. The conductor angle exceeds the standard tangent/light-angle conditions or when structural loading becomes unbalanced or compounded, including:

.1.1a. Medium & Heavy Angle (Corner poles)

.1.1b. Dead ends

.1.1c. Junction Poles

.1.1d. All structures involved in Grade B or Grade C when in highway crossings, to confirm pole loading and sag conditions under worst-case requirements.

.1.2. Installing equipment:

.1.2a. Transformer banks or single units 25 kVA and above

.1.2b. Capacitor Banks

.1.2c. Voltage Regulator

.1.2d. 3-phase Switches

.1.2e. Primary metering equipment

.1.3. Installing 3rd party antennas, battery-backup units, or other heavy communication equipment are mounted on corner poles.

.1.3a. If equipment is not available in the Pole Foreman preset library, a User-Defined entry must be created using the known physical characteristics (geometry, weight, and attachment height).

## Appendix A

1.0 Parameters for Calculation

- Span Length 200 feet
- 10 foot Cross
- Grade C (Crossing)
- Guy lead ration at 1/3
- Soile Classification Average
- Max light angle based on **DTR 07.011**
- Three Communications Cables 1.5”, 2.0” and 2.5
- Neutral Selection and Heights based on **DTR 04.047**
- 18M Guy Wire and 14”, Single Heliz Anchor & 1” Rod
- New pole set; 100% Strength Remaining

### .1.4. Crossarm Construction

**Crossarm Construction - Pole Loading for Tangent & Light Angle**

| | Class 2 | | | | | | | | Class 1 | | | | | | | | Class H1 | | | | | | | | Class H2 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 40 | | 45 | | 50 | | 55 | | 40 | | 45 | | 50 | | 55 | | 40 | | 45 | | 50 | | 55 | | 40 | | 45 | | 50 | | 55 | |
| | H.e | V.e | H.e | V.e | H.e | V.e | H.e | V.e | H.e | V.e | H.e | V.e | H.e | V.e | H.e | V.e | H.e | V.e | H.e | V.e | H.e | V.e | H.e | V.e | H.e | V.e | H.e | V.e | H.e | V.e | H.e | V.e |
| 1/0 ACSR 175 MIL | 44% | 51% | 40% | 34% | 43% | 49% | 43% | 78% | 38% | 49% | 34% | 26% | 36% | 37% | 36% | 59% | 32% | 38% | 29% | 21% | 31% | 23% | 30% | 45% | 28% | 30% | 24% | 16% | 26% | 22% | 26% | 36% |
| 336 AAC 175 MIL | 46% | 55% | 45% | 63% | 45% | 68% | 44% | 70% | 38% | 42% | 38% | 48% | 37% | 51% | 36% | 53% | 32% | 32% | 32% | 37% | 32% | 35% | 30% | 40% | 28% | 25% | 27% | 28% | 27% | 27% | 26% | 32% |
| 477 AAC 150 MIL | 46% | 57% | 45% | 64% | 46% | 69% | 45% | 69% | 38% | 43% | 38% | 43% | 37% | 52% | 37% | 53% | 32% | 33% | 32% | 38% | 32% | 41% | 31% | 40% | 28% | 26% | 27% | 29% | 27% | 29% | 27% | 31% |
| 556 AAC 175 MIL | 47% | 60% | 46% | 69% | 46% | 75% | 45% | 79% | 39% | 45% | 39% | 52% | 38% | 56% | 37% | 59% | 33% | 35% | 33% | 40% | 33% | 41% | 31% | 45% | 28% | 27% | 27% | 31% | 27% | 31% | 27% | 36% |
| 795 AAC 160 MIL | 53% | 62% | 53% | 73% | 53% | 77% | 51% | 80% | 44% | 46% | 44% | 55% | 43% | 57% | 42% | 60% | 37% | 36% | 38% | 43% | 33% | 43% | 35% | 46% | 32% | 28% | 32% | 33% | 31% | 34% | 31% | 36% |



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### .1.5. Spacer Construction

| | Spacer Cable Construcition - Pole Loading for Tangent & Ligth Angle | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Class 2 | | | | | | | | Class 1 | | | | | | | | Class H1 | | | | | | | | Class H2 | | | | | | | |
| | 40 | | 45 | | 50 | | 55 | | 40 | | 45 | | 50 | | 55 | | 40 | | 45 | | 50 | | 55 | | 40 | | 45 | | 50 | | 55 | |
| | H.e | V.e | H.e | V.e | H.e | V.e | H.e | V.e | H.e | V.e | H.e | V.e | H.e | V.e | H.e | V.e | H.e | V.e | H.e | V.e | H.e | V.e | H.e | V.e | H.e | V.e | H.e | V.e | H.e | V.e | H.e | V.e |
| 1/0 AAC 35kV 052 AWA Mess | 47% | 47% | 47% | 53% | 47% | 58% | 46% | 60% | 39% | 31% | 39% | 35% | 38% | 37% | 38% | 39% | 33% | 24% | 33% | 27% | 33% | 29% | 32% | 29% | 28% | 18% | 28% | 24% | 28% | 22% | 27% | 23% |
| 336 AAC 35kV 052 AWA Mess | 43% | 45% | 48%% | 51% | 43% | 56% | 48% | 65% | 40% | 34% | 40% | 39% | 40% | 42% | 39% | 43% | 34% | 26% | 34% | 30% | 34% | 32% | 33% | 33% | 29% | 20% | 28% | 23% | 29% | 30% | 29% | 32% |
| 477 AAC 35kV 052 AWA Mess | 43% | 47% | 43% | 54% | 50% | 71% | 43% | 75% | 41% | 35% | 41% | 41% | 41% | 44% | 40% | 46% | 35% | 27% | 35% | 32% | 35% | 34% | 33% | 35% | 30% | 21% | 29% | 24% | 29% | 26% | 29% | 28% |
| 556 AAC 25kV 052 AWA Mess | 50% | 56% | 43% | 65% | 43% | 72% | 43% | 81% | 41% | 42% | 41% | 43% | 40% | 44% | 40% | 46% | 34% | 27% | 35% | 32% | 35% | 34% | 33% | 35% | 29% | 21% | 29% | 24% | 29% | 32% | 29% | 28% |
| 795 AAC 35kV 19#8 AW Mess | 45% | 43% | 50% | 65% | 50% | 74% | 52% | 84% | 43% | 42% | 42% | 53% | 41% | 55% | 43% | 70% | 35% | 28% | 36% | 33% | 35% | 43% | 36% | 53% | 27% | 20% | 28% | 25% | 29% | 33% | 31% | 42% |

## 2.0 Aerial Cable Construction

| | Aerial Cable Construction - Pole Loading for Tangent & Ligth Angle | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Class 2 | | | | | | | | Class 1 | | | | | | | | Class H1 | | | | | | | | Class H2 | | | | | | | |
| | 40 | | 45 | | 50 | | 55 | | 40 | | 45 | | 50 | | 55 | | 40 | | 45 | | 50 | | 55 | | 40 | | 45 | | 50 | | 55 | |
| | H% | V% | H% | V% | H% | V% | H% | V% | H% | V% | H% | V% | H% | V% | H% | V% | H% | V% | H% | V% | H% | V% | H% | V% | H% | V% | H% | V% | H% | V% | H% | V% |
| 350 Al 25kV | 61% | 90% | 60% | 82% | 60% | 88% | 58% | 89% | 51% | 55% | 50% | 62% | 49% | 66% | 48% | 67% | 43% | 42% | 43% | 48% | 42% | 52% | 40% | 51% | 37% | 33% | 36% | 37% | 36% | 40% | 35% | 41% |
| 500 Al 35kV | 63% | 74% | 61% | 84% | 62% | 90% | 59% | 91% | 52% | 56% | 52% | 64% | 50% | 68% | 49% | 68% | 44% | 43% | 44% | 49% | 43% | 53% | 41% | 52% | 38% | 34% | 37% | 38% | 36% | 41% | 36% | 42% |
| 750 Al 25kV | 64% | 76% | 62% | 85% | 62% | 92% | 60% | 92% | 53% | 57% | 52% | 65% | 51% | 69% | 50% | 69% | 45% | 44% | 44% | 50% | 44% | 54% | 41% | 53% | 38% | 35% | 37% | 39% | 37% | 42% | 36% | 42% |

**NOTE**:

1) **%H (Horizontal Loading):** This represents the Horizontal load component. In pole analysis, this usually refers to the forces applied perpendicular to the pole's vertical axis, such as wind pressure on the pole and conductors, or the horizontal tension from wire **angles and** deadends.
2) **%V (Vertical Loading):** This represents the vertical load component. This includes the downward weight of the pole itself, attached equipment (transformers, crossarms, etc) and the vertical weight of the conductors (power and communications), including additional ice loading.



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