Joint Use Wood Pole Line Design: Required Clearances, Loadings, & Strengths

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Featuring a Tutorial on SAG10 sag & tension software

May 11-15, 2015 • October 12-16, 2015 - Myrtle Beach, SC

Instructor: Allen L. Clapp, PE

3.15 CEUs, 31.5 PDHs

About the seminar

This special 4.5 day seminar on Joint-Use Wood Pole Line Design: Required Clearances, Loadings, and Strengths addresses the increasing problem of accommodating larger numbers and sizes of cables and conductors on wood pole utility lines. Unfortunately, line failures and clearance problems have increased in recent years due to overloading poles.

Attendees will (1) learn and complete exercises on National Electrical Safety Code clearances, loading, and strength requirements and (2) learn and use Southwire's SAG10 sag and tension program to determine sags for clearance design (including inclined spans, marker balls, and overlashed cables) and tensions for pole, guy, and anchor design. Attendees will learn how to calculate loads on, and strengths of, individual components using the NESC allowable stress methodology. Computer computations will be briefly discussed.

This course is particularly designed for engineers and technicians who want to add or increase expertise in facility placement, clearance determination, and structural engineering of wood pole lines. Written answers are given for each question of the practical exercises worked in class, including rule references. Additional exercises and answers are provided for later use by attendees.

Who should attend

- designers and staking technicians
- engineering technicians
- make-ready and final inspectors
- electrical engineers
- standards developers
- contractors

Important topics

- Use SAG10 program to determine sags and tensions
- Determine required clearances on pole lines and at line crossings
- Determine required wood pole height and class
- Determine if new facilities can be added to existing wood poles
- Determine required clearances between wires and cables at the pole and required pole height
- Determine required Grade of Construction
- Calculate wind and ice loadings on structures and supported facilities
- Calculate stress on poles and crossarms
- Calculate strength of poles and crossarms
- Determine required pole class
- Properly use the NESC to develop standards and joint-use contracts for new construction or check compliance of existing construction
- Increase pole life and reliability
- Responsibilities for meeting NESC requirements
- Rationale behind NESC requirements

Bring a PC laptop set up to be able to download and install software. Check with your IT folks to make sure you can install software on the laptop you bring. No Mac or iPad devices.

It is recommended that students bring a scientific calculator.

In addition, you receive

- 2012 National Electrical Safety Code
- NESC Handbook, 7th Edition
- Demo copy of Southwire's SAG10 sag and tension software
- Bound Student Workbook
- Bound Appendix Book of helpful charts, tables and technical discussions
- Excerpts from Practical Utility Safety
- Exercise/Answer sets
- CEUs and NC PDHs awarded upon successful completion of workshop
- Plus continental breakfasts, lunches, & refreshments

4.5 Days — $2,145

Day 1

- Introduction
- Organization of the NESC
- Utility Responsibilities
- How and when to use NESC "Grandfather Clause"
- Definitions and References
- Practical consideration of: effects of difficulties in obtaining desired sag/tensions and guying tensions, long spans next to short spans, etc.
- Using SW Rate to calculate conductor temperature
- Vertical Clearances of lowest wires or cables above ground rails and water
- Vertical and horizontal clearances between wires, conductors and cables
  - At the pole
  - In the span
- Using sag and tension calculations
- Effects of differences in sags and tensions on clearances and loads

Day 2

- SAG10 Tutorial
  - Basic SAG10 menus
  - Setting up a project
  - Ruling spans
  - Calculating sags & tensions
  - Stringing Sags
  - Offset clipping
  - Catenary curve shape
- SAG10 Tutorial continued
  - Clearances at line crossings
  - Marker balls
  - Cable messengers
  - Inclined spans
- Overhead clearances continued

Day 3

- How to determine correct joint-use cable in the field position to meet NESC design condition clearances
- Calculations of required clearances at poles for various spans, types and sizes of power conductors and cables and telephone and CATV cables
  - Supply space
  - Communication space
  - Communication worker safety zone
- Special considerations for fiber-optic cables
- Selection of pole heights for various spans and configurations
- Required Grades of Construction, required loadings, and load factors
- Assumed loads and design loads
- Required strength factors
- Strengths & loadings primer
  - Loads
  - Reactions
- Pole loading and strength calculations:
  - Simplified force calculations
  - Shear forces
  - Overturning & bending moments
  - Wind on poles & supported facilities
  - Force, moments, & shear diagrams
  - Stress calculations

Day 4

- Pole weight
- Pole strength
- Reduced pole strength due to rot
- Buckling
  - Tangent
  - Angles
  - Deadends
- Calculating the strength of poles and crossarms
  - At groundline
  - At supply space
  - At bolt holes
  - At intermediate points
- Pole embedment depth
- Example calculations
  - Calculating required pole strength class for various configurations
  - Guying for deadends and angles, including
    - Required guy strength
    - Effects on poles
  - Buckling strength for deadend, angle and transformer poles
  - Calculating maximum spans for various configurations
  - Adding cables or conductors to existing lines
    - Effect of overlashed cables
- Determining appropriate clearance specifications and loading limits in joint-use contracts

Day 5

- Calculating bending stresses caused by conductor angles/deadends and guys on poles
- Calculating the limitations on use of sidewalk street guys and pole push braces

Note: Adjourn @ 11:00am; plan flights for 1:30pm or later.