# Overhead Line Design: Conductor Sags, Tensions and Clearances

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## Featuring a Tutorial on SAG10 sag & tension software

**March 14–17, 2016 — Myrtle Beach, SC**

**Instructor:** Allen L. Clapp, PE

2.4 CEUs, 24 PDHs

## About the seminar

This special 3.5 day seminar on Overhead Line Design: Conductor Sags, Tensions and Clearances 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 improper attachments.

Attendees will (1) learn and complete exercises on National Electrical Safety Code clearances, 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.

This course is particularly designed for engineers and technicians who want to add or increase expertise in facility placement and clearance determination on overhead 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 if new facilities can be added to existing poles
- Determine required clearances between wires and cables at the pole and required pole height
- Properly use the NESC to develop standards and joint-use contracts for new construction or check compliance of existing construction
- Responsibilities for meeting NESC requirements
- Rationale behind NESC requirements

## 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

**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.**

## 3.5 Days — $1,745

### Day 1

- Introduction
- NESC Organization
- Utility Responsibilities and options
- How and when to use the 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
- Using sag and tension calculations
- Introduction to vertical clearances of lowest wires or cables above ground rails and water
- Vertical & horizontal clearances between wires, conductors & cables
  - At the pole
  - In the span
- Using sag & 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

- Overhead clearances continued
- Vertical clearances
- Crossing clearances
- How to determine correct joint-use cable position in the field 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 Clearances to buildings, signs, tanks, and other installations

### Day 4

- Clearances to other line structures
- Clearances to buildings, signs, tanks, and other installations
- Bridge clearances
- Swimming pool clearances
- Clearances to grain bins, coal silos, etc.
- Conductor to conductor clearances
- Climbing space clearances
- Working space clearances

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