

# SpanLite™ Frequently Asked Questions

## 1. What is a “catenary” power line?

FAA Advisory Circular 70/7460-1M (Nov. 2020), which addresses Obstruction Marking and Lighting, defines “catenary” as “suspended wires (or lines) kept at a defined mechanical tension by supporting structures”. Examples of catenary power lines includes lines that cross rivers, canyons, and lakes, as well as certain lines in proximity to heliports and airports.

## 2. Why do catenary power lines need lighted markers?

The FAA advisory (cited above) calls for marking catenary power lines (69 kV or greater) with lighted “marker balls”. The goal is to make catenary lines more visible to pilots both day and night.

## 3. Does SpanLite satisfy the FAA advisory?

Yes, SpanLite meets or exceeds the guidelines in the FAA advisory for lighting and marking catenary lines up to 500 kV and higher.

## 4. What about other kinds of power lines?

In addition to marking catenary power lines, SpanLite is an effective solution for marking nearly any power line day and night. SpanLite should be considered for any location where pilots might have difficulty seeing a power line in their path. (Heliports are a good example.)

## 5. Can SpanLite be used as a tower light?

Absolutely! Monopoles 150 feet or less often have one conductor near the top of the pole. A SpanLite can be mounted near the top insulator on the conductor and provide the recommended 2-810 FAA LED steady red lights. There is no need for a transformer and associated electrical systems. This is an ideal solution for remote locations, such as Alaska, where solar or direct power is not an option. The marker simply lights up when attached directly to the live line (minimum 40 amps).

## 6. How does SpanLite work?

P&R Tech’s patented flux capacitor and solid state regulator built into SpanLite use the electrical field generated around the powered line to continuously illuminate the two 810 lights at 32.5 candela each. SpanLite installs directly on live lines from 15 kV to 500+ kV and carrying from 40–2,000 Amps.

## 7. What happens if the line suffers an outage or is taken out of service?

The FAA acknowledges that lighted markers (which include SpanLite) will go dark. Of course, the SpanLite marker still marks the line for visibility in daytime. (In most cases, tower light systems will also go dark, as they too will have lost power.) A minimum current is required to power a lighted marker. SpanLite requires a minimum of 40 amps to fully illuminate both 810 obstruction lights to 32.5 candela. (The lights start shining at 20 amps.)

## 8. Which size of SpanLite should I use?

The FAA advisory specifies 36 inch diameter lighted markers on “**extensive**” catenary wires.\* “**Less extensive**” wires can use 12, 20, or 24 inch markers. (SpanLite is available in 12, 24, and 36 inch models.) The distinction between “**extensive**” and “**less extensive**” is not defined in the FAA advisory. In practice, *P&R Tech suggests that 36 inch SpanLite markers be used only on extensive catenary lines.* For all other lines, 12 or 24 inch SpanLite markers have a lower wind loading profile, weigh less, and cost less.

\*An exception to the 36 inch guideline is allowed for closely spaced lines, such as “double bundled” transmission lines. For example, if spacing is 18 inches, a 12 inch SpanLite can be used as it has a 6 inch radius.

## 9. How many SpanLite markers will I need?

Lighted markers should be spaced equally along the wire at intervals of approximately 200 feet (61 m), or a fraction thereof. 25 feet is the maximum allowable distance between the highest wire installed with marker balls and the highest wire without marker balls. (Wire sag or droop will occur due to temperature, wire weight, wind, etc.) On less extensive catenary lines the FAA may recommend fewer lighted markers.

## 10. What color markers should I use?

Lighted and unlighted markers should be installed by alternating solid-colored markers of aviation orange, white, and yellow (with aviation orange at each end). For three or fewer markers in a sequence, all markers should be aviation orange.

## 11. Which sections of the FAA advisory specifically apply to lighted markers?

See the next four pages. For the complete advisory, visit the SpanLite page at [pr-tech.com](http://pr-tech.com).

## CHAPTER 10. MARKING AND LIGHTING OF CATENARY AND CATENARY SUPPORT STRUCTURES

### 10.1 **Purpose.**

This chapter provides guidelines for marking and lighting catenary and catenary support structures. For the purpose of marking and lighting, catenary is defined as suspended wires (or lines) kept at a defined mechanical tension by supporting structures. These wires may be either energized or non-energized and are used for transmission, distribution, or for other purposes, as defined. The recommended marking and lighting of both the structures and wires provides day and night conspicuity and assists pilots in identifying and avoiding catenary wires and associated support structures.

### 10.2 **Catenary Marking Standards.**

Catenary wires should be marked with lighted or unlighted marker balls to make the wires more visible to pilots approaching the hazard. High-voltage (69 kV or greater) transmission lines are typically mounted on large catenary support structures and should be fitted with lighted markers to provide sufficient conspicuity in both day and nighttime conditions. Transmission lines that are less than 69 kV are typically mounted on smaller catenary support structures and should be fitted with unlighted markers that provide daytime conspicuity.

#### 10.2.1 Catenary Markers.

Lighted markers provide increased nighttime conspicuity of high-voltage (69 kV or greater) transmission line catenary wires. However, since lighted markers require a minimum line load to operate, it should be noted that the lights may not be operational under certain transmission system conditions, such as power outages or line maintenance. These lighted markers should be used on transmission line catenary wires near airports, heliports, across rivers, canyons, lakes, areas of known risk to aviation, etc. The lighted markers should be manufacturer-certified as (1) recognizable from a minimum distance of 4,000 feet (1,219 m) under nighttime conditions, (2) minimum VFR conditions, or (3) have a minimum intensity of at least 32.5 candelas. The lighting unit should emit a steady-burning red light. Lighted markers should be used on the highest energized line. If the lighted markers are installed on a line other than the highest catenary wire, then the unlighted markers specified in Chapter 3 paragraph 3.5 should be used in addition to the lighted markers. The maximum sag distance between the line energizing the lighted markers and the highest catenary wire above the lighted markers should be no more than 25 feet (7.6 m), and it should not violate the sag requirements of the transmission line design. (See Figure A-5 in Appendix A.) Markers should be distinctively shaped, i.e., spherical or cylindrical, so that they are not mistaken for items used to convey other information. They should be visible to a pilot approaching from any direction. The area in the immediate vicinity of the supporting structure's base should be clear of all items and/or objects of natural growth that could interfere with the line-of-sight between a pilot and the structure's markers.

### 10.2.1.1 Size and Color.

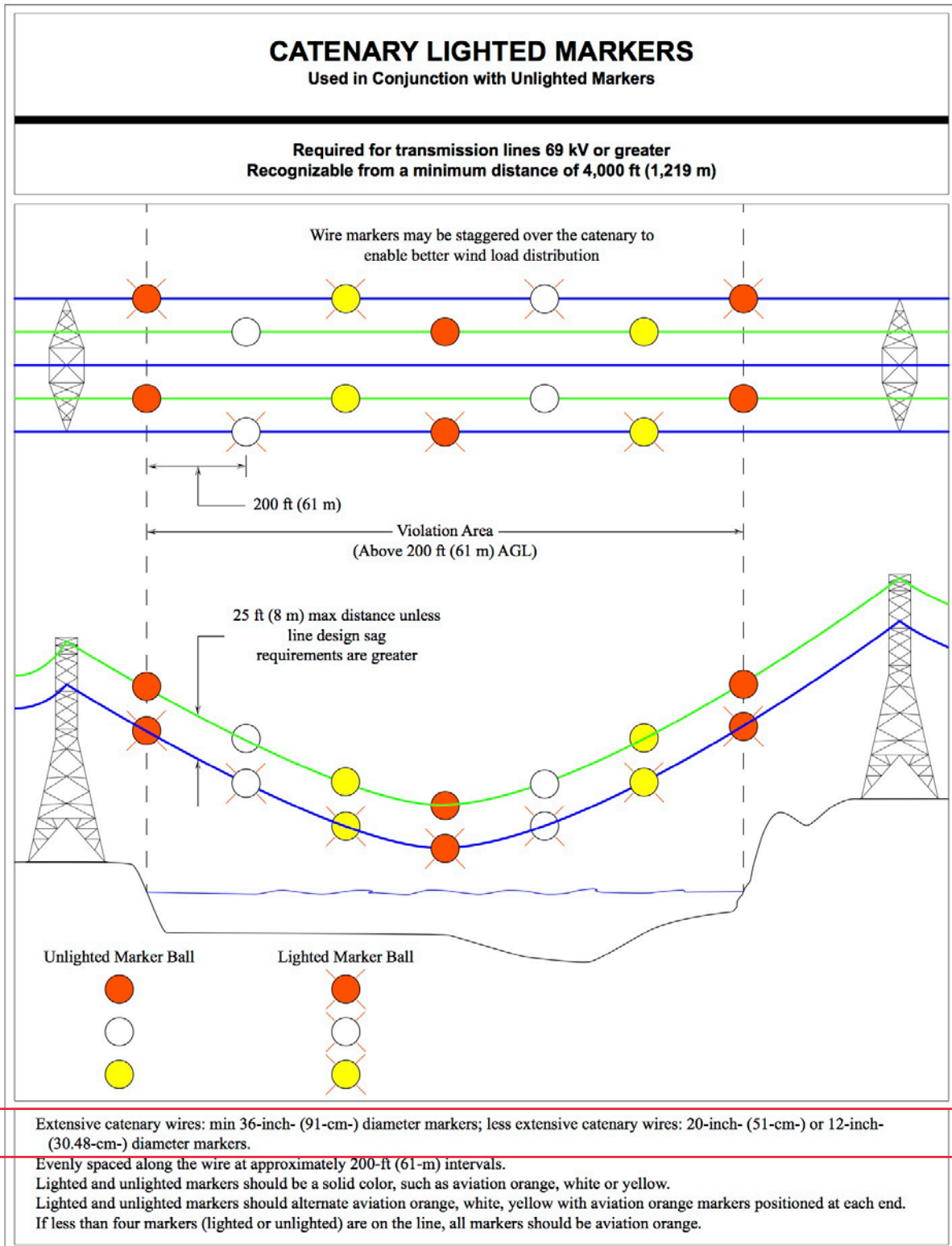
The diameter of the markers (lighted and unlighted) used on extensive catenary wires that cross canyons, lakes, rivers, etc., should not be less than 36 inches (91 cm). Preferred 20-inch (51-cm) markers, or smaller 12-inch (30.48-cm) markers, are permitted on less extensive catenary wires or on power lines below 50 feet (15 m) above the ground and within 1,500 feet (458 m) of an airport runway end. Each lighted marker should be a solid color; specifically aviation orange, white, or yellow. For transmission lines that are configured in a “double-bundled” arrangement and would typically require the larger 36-inch markers, the next smaller size marker may be used to prevent the marker from rubbing against the parallel transmission line.

### 10.2.1.2 Installation.

1. Spacing. Lighted markers should be spaced equally along the wire at intervals of approximately 200 feet (61 m), or a fraction thereof. Intervals between markers should be less in critical areas near runway ends, i.e., 30 feet to 50 feet (10 m to 15 m). If the lighted markers are installed on a line other than the highest catenary wire, then unlighted markers specified in Chapter 3 paragraph 3.5 should be used in addition to the lighted markers. The maximum distance between the line energizing the lighted markers and the highest catenary wire above the line with the lighted markers can be no more than 25 feet (7.62 m), so long as the requirement does not violate the transmission line design’s droop requirement. The lighted markers may be installed alternately along each wire if the distance between adjacent markers meets the 200-foot (61m) spacing standard. This method allows the weight and wind loading factors to be distributed. (See Figure A-5 in Appendix A.)
2. Pattern. An alternating color scheme provides the most conspicuity against all backgrounds. Lighted and unlighted markers should be installed by alternating solid-colored markers of aviation orange, white, and yellow. Normally, an orange marker is placed at each end of a line and the spacing is adjusted [not to exceed 200 feet (61 m)] to accommodate the rest of the markers. When less than four markers are used, they should all be aviation orange. (See Figure A-5 in Appendix A.)
3. Wire Sag. Wire sag or droop will occur due to temperature, wire weight, wind, etc. Twenty-five (25) feet (7.62 m) is the maximum allowable distance between the highest wire installed with marker balls and the highest wire without marker balls, and it should not violate the transmission line design’s sag requirements. (See Figure A-5 in Appendix A.)
4. Adjacent Lines. Catenary crossings with multiple transmission lines require appropriate markers when the adjacent catenary structure’s

outside lines are greater than 200 ft (61 m) away from the center of the primary structure. (See Figure A-2 in Appendix A.) If the outside lines of the adjacent catenary structure are within 200 ft (61m) or less from the center of the primary structure, markers are not required on the adjacent lines. (See Figure A-3 in Appendix A.)

**Figure A-5. Catenary Lighted Markers**



**Figure A-5. Catenary Lighted Markers**