

KwikClamp Cable Hanger Spacing: Considerations and Guidelines

Introduction

Recommended hanger spacing is tabulated, on the following pages, for various HELIAX[®] hangers and cable types. This spacing is tabulated as a function of wind speed and icing conditions. These recommendations have been derived from extensive mechanical, environmental, and wind tunnel testing. They are based on the guidelines stated in EIA Standard RSS-222 (Structural Standards for Steel Antenna Towers and Antenna Supporting Structures) and BSI CP3: Chapter V: Part 2 (Code of Basic Data for the Design of Buildings, Wind Loading). Adherence to proper structural mounting arrangements and installation procedures is assumed in the recommendations.

Although the tabulations are given as a function of wind speed and radial ice, there are other factors that must be taken into consideration, such as those described in the following paragraphs.

Geography

Geographical location may have a significant impact on installation conditions. Coastal Installations may be in the path of hurricanes producing high values of sustained wind. Mountainous regions may be subjected to extreme wind gusts. Location also dictates the design basic wind speed, which is the highest wind speed at a height of 10 meters over open terrain. Published values of basic wind speed have been compiled for various counties and states in EIA TIA-222-E.

Mounting Structure Integrity

Andrew hangers are designed for severe mechanical and environmental conditions. However, the mounting arrangement and structural integrity of the tower or structure to which the hangers are attached must be taken into account. A poorly designed mounting structure may tend to vibrate excessively, subjecting hangers to extreme stress and fatigue. In such cases, the mounting geometry should be reevaluated and the hanger spacing reduced.

Mounting Structure and Height

Tower height and height above average ground level must be considered when calculating hanger spacing. For towers

and structures greater than 100 feet, it is important to review the requirements and guideline stated in the EIA Standard RS-222 (Structural Standards for Steel Antenna Towers and Antenna Supporting Structures). Wind loading results in horizontal forces being applied to hangers. The horizontal force applied to each hanger can be approximated by (see EIA TIA-222-E):

$$F = \text{Wind load applied to hanger} = q_z C_f A_p G_h$$

$$q_z = \text{Velocity pressure} = 0.00256 K_z (V)^2$$

$$K_z = \text{Velocity pressure exposure coefficient} = (Z/33)^{0.288} \text{ (for } z \text{ in feet and } 1 < K_z < 2.58)$$

$$Z = \text{Height above average ground level to midpoint of the section}$$

$$V = \text{Basic wind speed}$$

$$G_h = \text{Gust response factor (see EIA-222)}$$

$$C_f = \text{Structure force coefficient (1.2 for cable)}$$

$$A_p = \text{Projected area (cable diameter x hanger spacing)}$$

By combining the foregoing variables, the force applied to a hanger due to wind loading is:

$$F = \text{Wind load applied to hanger} = 0.000256 (Z/33)^{0.288} (V)^2 C_f G_h \text{ (cable diameter x hanger spacing)}$$

From the above equations, note that the velocity pressure exposure coefficient and the gust response factor introduce some height dependence in the amount of force applied to the hanger.

Icing

A large accumulation of radial ice will dramatically increase the projected area, resulting in a significant increase in loading. It is important to know if, for the given geographic area, significant icing and high wind loading are occurring simultaneously. However, the probability of an extreme wind load is low, allowing some reduction in overall wind loading.

Wind Loading

The loads applied to a hanger transmitted through the cable arise from various phenomena. However, as the equation for F states, the very important relationship that the force applied to a hanger is proportional to the square of the wind velocity. Therefore, for extreme wind-loading environments, it is critical to carefully review hanger spacing considerations and adhere to proper mounting procedures. Aside from the weight of the cable and ice accumulation, the holding integrity of the hanger is impacted predominately by the static drag load, vortex shedding, and atmospheric turbulence induced from wind, as well as the natural resonating frequencies of the structure.

Severe Conditions

Andrew hangers are designed and extensively tested for their mechanical integrity, their ability to survive severe environmental conditions, and their ability to support transmission lines, without creating electrical discontinuities. Laboratory testing includes wind tunnel testing, ice loading, axial loading, vibration, static side loading, normal loading, thermal cycling, salt spray (corrosion), UV exposure, metallurgical evaluation, time domain reflectometry, and VSWR. Proper selection of hanger type, hanger spacing, and hanger installation will ensure that these hangers will withstand the most demanding requirements for your wireless system.

Maximum Hanger Spacing Tables

The maximum spacing recommendations are made in the following tables assuming that all hangers are properly installed and tightened.

Maximum Hanger Spacing for KwikClamp Hangers

Cable Size	Cable Type	Hanger Part Number	Recommended Maximum Hanger Spacing feet (meters) *
Wind Speed			85 mph (136 km/h)
Radial Ice			No Ice
1/2"	Corrugated, Smoothwall	L4CLAMP-() 1 Stack	6 (1.83)
1/2"	Corrugated, Smoothwall	L4CLAMP-() 2 Stack	6 (1.83)
1/2"	Corrugated, Smoothwall	L4CLAMP-() 3 Stack	6 (1.83)
5/8"	Corrugated, Smoothwall	L45CLAMP-() 1 Stack	6 (1.83)
5/8"	Corrugated, Smoothwall	L45CLAMP-() 2 Stack	6 (1.83)
5/8"	Corrugated, Smoothwall	L45CLAMP-() 3 Stack	6 (1.83)
7/8"	Corrugated, Smoothwall	L5CLAMP-() 1 Stack	6 (1.83)
7/8"	Corrugated, Smoothwall	L5CLAMP-() 2 Stack	6 (1.83)
7/8"	Corrugated, Smoothwall	L5CLAMP-() 3 Stack	6 (1.83)
1-1/4"	Corrugated, Smoothwall	L6CLAMP-() 1 Stack	6 (1.83)
1-1/4"	Corrugated, Smoothwall	L6CLAMP-() 2 Stack	6 (1.83)
1-1/4"	Corrugated, Smoothwall	L6CLAMP-() 3 Stack	6 (1.83)
1-5/8"	Corrugated, Smoothwall	L7CLAMP-() 1 Stack	6 (1.83)
1-5/8"	Corrugated, Smoothwall	L7CLAMP-() 2 Stack	6 (1.83)
1-5/8"	Corrugated, Smoothwall	L7CLAMP-() 3 Stack	6 (1.83)

* Hanger spacing specifications apply only to tower heights less than 100 feet (30 meters).