



ANSI/TIA-222 Maintenance and Condition Assessment of Telecommunication Towers

What is ANSI/TIA-222 and why is it important for the telecommunications industry? ANSI/TIA-222 is the “Structural Standard for Antenna Supporting Structures and Antennas”. ANSI/TIA-222 is critically important to the telecommunications industry for many reasons. Some of which are as follows:

- Direct link to the International Building Code (IBC);
- Provides guidelines for the procurement of structures;
- Establishes design parameters for structures; and
- Provides criteria for Maintenance and Condition Assessment of these structures.

This Planning Advisory Notice (PAN) focuses primarily on Section 14 of the ANSI/TIA-222 Standard. Section 14 covers minimum criteria for a proper Maintenance and Condition Assessment of antenna supporting structures. The current version of ANSI/TIA-222 is G-2, however, throughout this PAN, we will also be referencing the draft version of ANSI/TIA-222-H to communicate upcoming changes in Section 14. In addition to Section 14, Annex J (**Normative**) provides checklists for maintenance and condition assessment, field mapping of appurtenances and structural components as well as charts for determining twist and out of plumb on guyed towers. We will also touch on Annex K, as it brings tension, twist, and plumb together. To add clarity, a

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Normative designation simply means that Annex J carries the same weight and merit as the body of the Standard. An annex allows the Committee to provide information as a narrative or list when it is more effective than using the language limitations placed upon the body of the standard such as the scope, requirements, and the maintenance and condition assessment cycles.

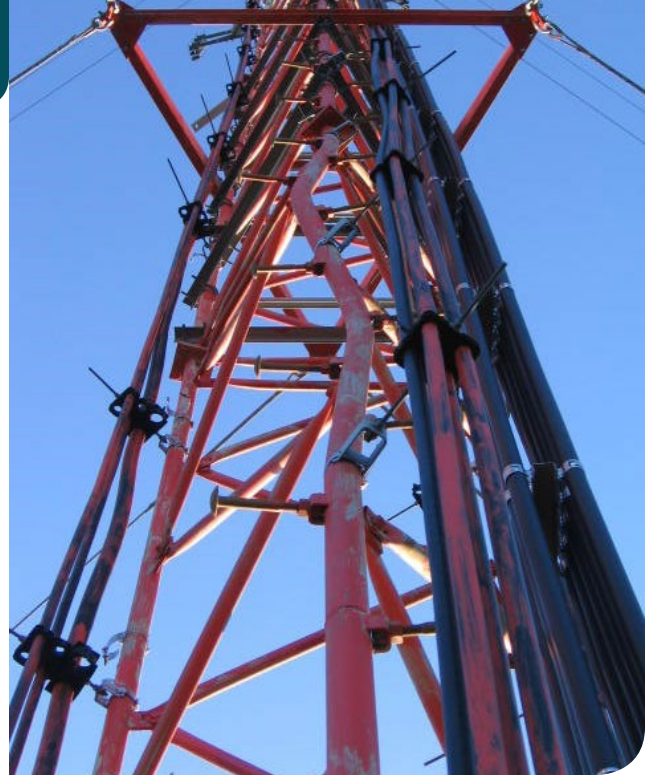
Revision H clarifies issues around safety climbs and inspection. ANSI/TIA-222-G Section 14 (**Scope**) states “This section addresses the maintenance and condition assessment of structures.” The following note is included in ANSI/TIA-222-H – “Maintenance and condition assessment requirements for safety climb systems are not within the scope of the Standard.” The safety climb system is an appurtenance while on the structure and does not become a safety climb system until a competent person uses it as part of a fall protection plan. So, while the safety climb may be assessed as a part of a maintenance and condition assessment of the structure it should not be considered usable as fall protection until inspected by a competent person as part of a complete fall protection plan. This logic also applies to any structural member (tower leg, diagonal, etc.) or connection considered for fall protection use by the competent person as part of their fall protection plan.

Proposed language in Revision H helps clarify recommended Intervals in section 14.4:

Maintenance and condition assessment recommendations are as follows:

1. Three-year intervals for guyed masts and five-year intervals for self-supporting structures.

Note: The intervals recommended are based on industry experience for communication structures designed and installed per EIA or ANSI/TIA-222 Standards. More frequent inspection intervals were found to be unwarranted.



2. After severe wind and/or ice storms or other extreme conditions.
3. Shorter inspection intervals may be required for Risk Category III or IV structures and structures in coastal regions, in corrosive environments, and in areas subject to frequent vandalism.

It is important to note that these are recommended intervals that tower owners or engineers use to formulate a site-specific maintenance and condition assessment plan. The recommended intervals can change based on factors such as age of the structure and/or how often they are assessed and maintained. There are cases, based on the location and type of structure, as well as other factors that the maintenance and assessment cycle may be extended beyond five years. The inverse is also true. For example, a guyed tower located in corrosive environment may require intervals that are more frequent. It is up to the owner and their engineering professionals to use the TIA recommendations to create a program that incorporates site-specific information such as the structure type, location and the environment.

Note two (2), in Section 14.4 (Rev H) recommends that assessments after extreme weather events could be warranted. For example, in the event of a category five (V) hurricane, tower owners and carriers typically choose to deploy teams to determine the extent of damage to their wireless infrastructure.

Maintenance is emphasized by being the first word of the title for this section as it is a critical component. Typically, references are made to TIA maintenance and condition assessments as inspections only. This is a misinterpretation of Section 14, as it is very important

to understand the critical nature of the word “Maintenance” as it is an actionable item. Depending on the types of maintenance issues discovered during a condition assessment, it is the expectation that the structure will be maintained in accordance with the owner’s maintenance plan to assure structural integrity. Items discovered, that could adversely affect the structure, should be brought to the tower owners attention immediately so its engineers and operations teams can determine what maintenance or repairs, if any, are required. To perform a condition assessment (inspection) without performing a proper maintenance review is contrary to the intent of the Standard.

Annex J is a guideline and checklist for the maintenance and condition assessment.

ANSI/TIA-222-G-2 Annex J: Maintenance and Condition Assessment **(Normative)** – The preamble reads as follows:

“This annex provides checklists for: (a) maintenance and condition assessment and (b) field mapping of structures and appurtenances.

Note: This annex does not provide means and methods for RF protection.”

Tower owners and their engineering support team(s) typically use Annex J as the baseline when creating site-specific maintenance and condition programs. ANSI/TIA-222 is a consensus standard based on best practices and comprised of committees, such as TIA TR-14. These individuals are subject matter experts voluntarily contributing their time and talent to the industry. Each subsequent ANSI/TIA Standard has been an improvement over the last. ANSI/TIA-222-H is no exception and TIA expects that earlier revisions will be superseded, except for the purposes outlined in the current published Standard. It is the TR-14 member’s expectation that the development of ANSI/TIA-222-H will help the entire industry.

Some of the critical areas covered in ANSI/TIA-222-H Annex J:



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J.1 – Maintenance and Condition Assessment

- A. Structure Condition
- B. Finish
- C. Lighting
- D. Grounding
- E. Appurtenances such as Mounts, Antennas and Lines
- F. Other Appurtenances (walkways, platforms, sensors, floodlights, etc.)
- G. Base Insulator Condition for AM Towers (AM detuning kits, fiberglass rods on broadcast towers, Phillystran, etc.)
- H. Guys
- I. Concrete Foundations
- J. Structure Alignment
- K. Previous Modifications to Structure

Annex J provides an excellent guide for tower owners and engineers to establish a site-specific condition and maintenance program. A properly managed maintenance and condition assessment program ensures that the structure is maintained in accordance with the manufacturer's recommendations and helps with the long-term performance of the structure. The annex also provides some base line information on mapping that should be considered by engineers when a mapping is required. The following is an overview of some of the subject area covered and in an upcoming PAN we will go into further detail on section J.2.

Section J.2 Provides guidelines for following:

- A. Mapping of Appurtenances
 - 1. Mounting Systems
- B. Mapping of Structural Members and Connections
 - 1. Self-Supporting Latticed Structures
 - 2. Guyed Masts
 - 3. Pole Structures
 - 4. Connections
- C. Tolerances
- D. Twist and Out-of-Plumb determination for Towers

Understanding Annex K (**Informative**) is recommended because it addresses the measurement of the guy wire tensions. Any adjustment to the tensions of the guy wires can also have an impact on the twist and plumb on the tower. Annex K provides the engineering equations and content related to measuring guy tensions, however it does not address the means and methods related to this type of work. As discussed in other PANs, ANSI/ASSE A10.48 should be considered for the means and methods. Annex K provides two basic methods for measuring guy wire tensions:

- A. Direct Method (load cell)
- B. Indirect Methods
 - 1. Pulse Method
 - 2. Tangent Intercept Method

Note that the approval of shunt dynamometers is a new addition as a method for measuring guy tensions for Revision H.

Once ANSI/TIA-222-H is approved (see process below), the PAN committee will delve further into these two annexes. Currently the TR-14 task group is finalizing the draft. Once the draft is finalized, the full committee will vote to approve. Once approved by the full committee there will be a public ANSI ballot/vote that will ultimately lead to the publication of ANSI/TIA-222-H - *Structural Standard for Antenna Supporting Structures and Antennas and Small Wind Turbine Structures*. ■