Rigging Fundamentals 101 (Rigging Hardware & Slings)

When it comes to load handling activities which includes lifting, individuals assigned to the various load handling tasks should at minimum know the basic rigging fundamentals before using rigging hardware such as shackles, hooks, links, rings, wire rope clips, turnbuckles, snatch blocks and slings. Knowing the fundamentals is critical to ensuring that those individuals working in and around telecommunication structures go home safe at the end of the day. This article consists of a series of rigging fundamental questions to answer before the load handling activity begins, while at the same time imparting some standard information pertinent to the industry.

Note: This article, however, is not intended to be an all-inclusive list *and* ***does not*** *attempt to cover all rigging fundamentals involved with all telecommunication structure load handling activities that may involve the structures, mounts, antennas, gin poles, winches, hoists, helicopter and special engineered lifts.*

Below are some of the KEY QUESTIONS to answer before the load handling activity begins:

1. HAS A RIGGING PLAN BEEN DEVELOPED?

The rigging plan is a critical first step to insuring proper procedures, equipment, and rigging are appropriate for the load handling activity to assure personnel safety, and stability of the structure and the components being lifted. The complexity of the rigging plan depends on the type of job and type of equipment necessary to complete the tasks. ANSI/TIA-322 states that rigging plans be prepared in accordance with ANSI/ASSE A10.48 and shall be utilized for all construction activities. Construction classes II, III & IV rigging plans must also be documented. See ANSI/TIA-322 & ANSI/ASSE A10.48 for full details.

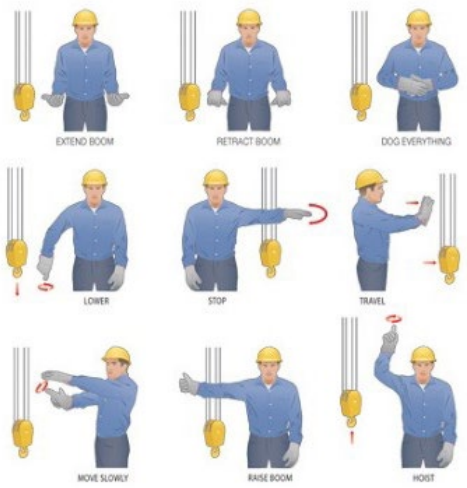
Authors: **Danny Bishop** (Corporate Director of Value Added Training, The Crosby Group, LLC). The members of the PAN Advisory Group who are involved in the writing and researching each PAN topic include: **John Erichsen Principal EET PE,** Chairman TIA committee TR 14), **Scott Kisting** (EVP – Proactive Telecommunications Solutions), **Richard Cullum** (Program Manager – Crown Castle), **Jeremy Buckles** (Safety and Compliance Officer – International, SBA Communications Corporation), **Craig Snyder** (President, Sioux Falls Tower & Communications), and **Stephanie Brewer** (Compliance Coordinator – MUTI-Sabre Industries Telecom Services).

See matrix below on Construction Classes as derived from the new ANSI/ASSE 10.48 Standard.

Minimum Construction Class	Minimum Level of Responsibility	Max Gross Lifted Load for Lift Systems Attached to the Structure	Rigging Plan Required	Documented Rigging Plan Required
I	Competent Rigger	350 lbs.	Yes	No
II	Competent Rigger	500 lbs.	Yes	Yes
III	Competent Rigger and Qualified Person	2,000 lbs.	Yes	Yes
IV	Competent Rigger and Qualified Person	Above 2,000 lbs.	Yes	Yes

2. WHO IS RESPONSIBLE FOR THE RIGGING AND LOAD HANDLING ACTIVITIES?

Having key designated personnel assigned to the specific tasks of crane operator, signal person, spotter, competent rigger, qualified person, and establishing who is responsible for preparing rigging plans is of major importance. The ANSI/TIA-322 and ANSI/ASSE A10.48 Standards also address the importance of communication and assignment of responsibilities. It states that the competent rigger must understand the applicable industry standards, have the knowledge, skill and ability with the procedures and equipment common to the telecommunication structures industry and trained to identify hazards and authorized to take corrective measures. ANSI/ASSE A10.48 also requires an on-site competent rigger to be designated for all classes of construction; however, for Class III and IV construction, a qualified person shall coordinate the involvement of a qualified engineer as required when establishing rigging plans.



3. HAS COMMUNICATION BEEN ESTABLISHED?

Establishing clear communication by use of approved hand signals or radios is of vital importance. The operator and signal person must be familiar with the industry standard hand signals and shall use approved radios, or other means of communications, when direct hand signals would create a hazard or if the ability of the crane operator to clearly see the signal person is a problem. If radios are used, they must be tested to ensure signal transmission is clear and reliable. A "qualified" signal person in construction is required and they must have understanding of ANSI/ASSE A10.48 which requires a designated competent person who meets the qualification criteria for a signal person in accordance with OSHA 1926.1428.

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4. IS THE RIGGING IN ACCEPTABLE CONDITION?

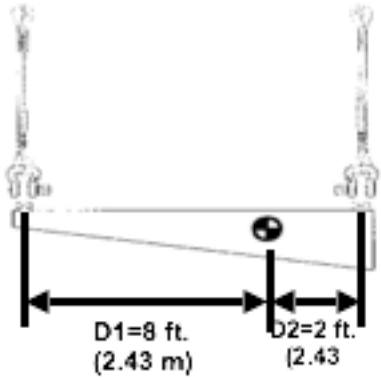
Too many accidents happen as a result of companies not having a designated competent person assigned to inspect the rigging gear and slings before use. ANSI/ASSE A10.48 requires a documented daily inspection prior to use on all components of a rigging system.

5. WHAT IS THE MAXIMUM GROSS LOAD TO BE MOVED OR LIFTED?

The weight of the load must be known, calculated, estimated or measured. However, please remember the maximum gross load not only includes the weight of the load but all associated rigging equipment. Rigging equipment may include but is not limited to the overhaul ball (headache ball), load-line, tag line, tag line force, trolley line, trolley line forces, and any other added weight or force that needs to be taken into consideration to ensure safety to personnel and structure stability.

6. WHERE IS THE CENTER OF GRAVITY (C.O.G) OF THE LOAD AND IS IT CORRECTLY CAPTURED BY THE SLINGS OR MATERIAL HANDLING DEVICE?

Too many individuals have a tendency to determine the weight of the load but bypass the critical next step of knowing where the center of gravity of the load is located. Estimating the location of the center of gravity helps determine if the C.O.G. is captured appropriately to ensure good load control during the entire load handling event. Location of C.O.G., also affects the loading in the sling legs and connection points.



7. IS THE RIGGING APPROPRIATE FOR LIFTING?

Make sure that the rigging gear is suitable for overhead lifting. ANSI/ASSE A10.48 requires rigging hardware and slings used for load handling and lifting to be specifically certified for such applications in accordance with applicable American Society of Mechanical Engineers (ASME) B30 standards. The use of rigging hardware not specifically covered by ASME B30 standards is discouraged, and should be avoided. See ANSI/ASSE A10.48 for full information.

8. DOES THE RIGGING HARDWARE & SLINGS HAVE PROPER IDENTIFICATION?

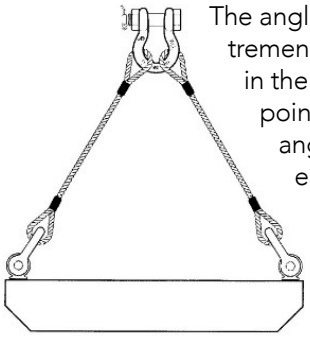
At a minimum all new rigging hardware should be identified with the name or trademark of the manufacturer. Below is an example of, per ASME B30.26, requirements for new rigging hardware identification.

- Shackle Body: Name or trademark of the manufacturer, rated load and size.
- Shackle Pin: Name or trademark of the manufacturer, grade, material type, or load rating.
- Wire Rope Clip Saddle: Name or trademark of manufacturer and size.
- Turnbuckle: Name or trademark of manufacturer, size or rated load.

ANSI/ASSE A10.48 requires wire rope slings to have a legible tag specifying its working load limit (WLL). Synthetic slings shall have a legible tag indicating the manufacturer's working load limit for the vertical, choked and basket configurations. Besides the specified (WLL) requirement, chain slings must have the manufacturers mark indicating the grade of chain. OSHA recommends only alloy grade chain for overhead lifting applications.

For full detailed information regarding minimum identification requirements, see ASME B30.26 (Rigging Hardware), ASME B30.10 (Hooks), ASME B30.9 (Slings), ANSI/ASSE A10.48 and OSHA 29 CFR.

9. IF USING MULTIPLE LEG SLINGS ATTACHED TO THE LOAD, WHAT IS THE SLING ANGLE?



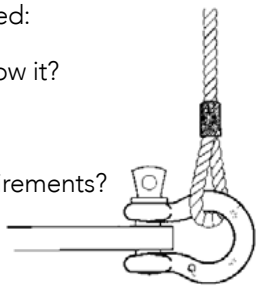
The angle of loading can have a tremendous effect on the loading in the sling legs and connection points. When slings work at angles opposed to each other, each sling works harder and the resultant loading in the sling legs can be much greater than their individual vertical share of the load.

ANSI/ASSE A10.48 (see gin pole section) encourages all sling angle of loading be set at 60 degrees or more. Sling angles less than 45 degrees shall require special attention. The minimum horizontal sling angle (angle of loading) allowed is 30 degrees unless approved by the sling manufacturer or a qualified engineer in compliance with an approved rigging plan.

10. WILL THERE BE ANY SIDE OR ANGULAR LOADING ON THE RIGGING GEAR?

The WLL of most rigging hardware is based on in-line loading. If the sling is to pull off at an angle, three more pieces of information are needed:

- Does the manufacturer allow it?
- Is the WLL affected?
- Are there any special requirements?



11. DOES THE RIGGING GEAR & SLINGS HAVE KNOWN WORKING LOAD LIMITS?

The working load limit is the maximum mass or force which the product is authorized to support in general service when the pull is applied in-line, unless noted otherwise, with respect to the centerline of the product. This term is used interchangeably with the following terms: WLL, rated load value, resultant working load.

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competent riggers and qualified persons should know the capacity of all the rigging gear and slings before use.

Other details to consider:

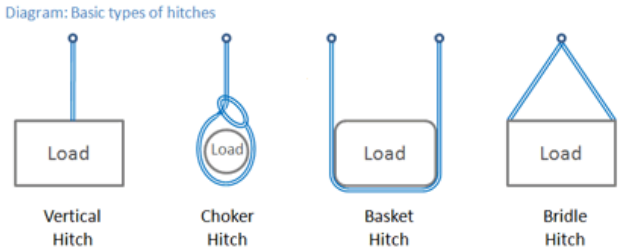
- Once the WLL of all rigging components are determined, we must ensure that all WLL's are appropriate for the load handling activity.
- ANSI/ASSE A10.48 states that the working load limit (WLL) shall be reduced by 50% when lifting personnel. In addition the OSHA CPL 02-01-056 must be adhered to when lifting personnel.

12. ARE THE SLINGS PADDED FOR PROTECTION FROM CORNERS, EDGES, PROTRUSIONS AND ABRASIVE SURFACES?

Too many accidents occur because individuals do not adequately protect the sling(s) from damage. The strength of slings can be reduced dramatically if not adequately protected. ASME B30.9 (Slings) gives instructions for protecting slings from edges, corners, protrusions and abrasive surfaces. WSTDA (Web Sling and Tie Down Association) is also an excellent source of information for synthetic slings.

13. IS THE HITCH APPROPRIATE FOR THE LOAD?

If not already pre-determined in the lift plan, the competent rigger or qualified person must determine the best method to attach the slings to the load. In rigging, there are three basic hitches. The straight-line hitch (vertical hitch), the choker hitch and the basket hitch. From these three basic hitches one can derive many possible options such as a two leg bridle hitch as shown below. Each has its advantages and disadvantages depending on the characteristics of the load. All loads must be rigged to ensure the load is as secure in the air as it was on the ground. It is critical to ensure that slings wrapped around the load such as choker and basket hitches do not slide along the load during the load handling activity.



14. IS A TAG LINE NEEDED TO CONTROL THE LOAD?

Proper load control requires the use of a tag line (or trolley configuration) to control swing, rotation, or position of the load when lifting. They are often needed to maintain clearance between the load and the structure, gin pole, or other obstructions. Proper knowledge of type of material, how to properly apply the tag line (or trolley line) to the load and proper use is essential.

15. HAVE THE WORKERS BEEN PROPERLY TRAINED?

OSHA 29 CFR 1926.1400 (construction) requires that crane operators, competent rigger, signal person and qualified persons be trained regarding requirements for their respective roles.

ANSI/ASSE A10.48 requires the rigger and qualified person(s) involved in construction or maintenance relating to the communications industry to have documented training based on the complexity of the scope of work (SOW). The training program is required to ensure that all employees have the knowledge and understanding of the standard and are able to prepare a rigging plan and perform the work according to an approved rigging plan.

16. WILL THE LOAD LIFT LEVEL, BE STABLE AND SECURE?

Proper load control means that the load lifts level, is stable and secure. Ensuring the proper attachment to the structure of the rigging equipment is the critical first step. Placing the load hook over the center of gravity is an essential step. Placing the sling(s) so as to capture the center of gravity properly will enable the proper handling of the load. Selecting best hitch and attachment method to insure the load is secure is next step in the process. The sling(s) should attach above the C.O.G. to avoid flipping the load. Good rigging practice also includes making sure that no sudden movements or rough handling of the load can cause the load to disengage from the slings. The competent person should always be aware of the SOW and ensure that all these activities occur when lifting a load, as well as verifying other conditions and communicating with all team members involved in the SOW.

17. ARE THERE ANY UNUSUAL ENVIRONMENTAL OR SPECIAL CONCERNS?

Weather related issues such as wind, ice, rain, snow, or a variety of possible non-weather related concerns may affect the rigging gear, slings and safe use. Consideration for these concerns should be given before starting any load handling activity.

In summary, it is definitely exciting times especially with the new ANSI/TIA -322, and the ANSI/ASSE A10.48 Standards becoming effective January 1, 2017. In addition, NWSA (National Wireless Safety Alliance) and NCCCO (National Commission for the Certification of Crane Operators) have partnered in a very beneficial endeavor to develop and provide certifications to enhance safety while working on towers and other non-standard structures. Current available certifications include: Rigger Level I, Rigger Level II, Signal Person, Tower Technician 1 and Tower Technician 2. The positioning requirements as defined by the Telecommunications Industry Registered Apprenticeship Program (TIRAP) are helping all employers and clients in the telecommunications industry understand the essential training and education requirements for the industry.

Sources of Information:

ANSI/TIA -322, Loading, Analysis, and Design Criteria Related to the Installation, Alteration and Maintenance of Communication Structures

ANSI/ ASSE A10.48, Criteria for Safety Practices with the Construction, Demolition, Modification and Maintenance of Communication Structures Standards

American Society of Mechanical Engineers (ASME) B30 Series

Occupational Safety & Health Administration (OSHA) CFR 29 1926.1400

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