



## IMPORTANT WARNINGS

**READ ALL WARNINGS BEFORE USING THIS PUBLICATION**  
Failure to follow warnings and instructions may result in serious injury or death.

### Working Load Limit

This is the term used throughout the catalog. There are, however, other terms used in the industry which are interchangeable with the term Working Load Limit. These are: WLL, SWL, Safe Working Load, Rated Load Value, Resulting Safe Working Load, and Rated Capacity.

**Never** exceed the Working Load Limit.

The Working Load Limit is the maximum load which should ever be applied to a product, even when the product is new and when the load is uniformly applied - straight line pull only. **Avoid side loading.** All catalog ratings are based upon usual environmental conditions, and consideration must be given to unusual conditions such as extreme high or low temperatures, chemical solutions or vapors, prolonged immersion in salt water, etc. Such conditions or high-risk applications may necessitate reducing the Working Load Limit.

**Working Load Limit will not apply if product has been welded or otherwise modified.**

### Matching of Components

Components must match. Make certain that components such as hooks, links or shackles, etc. used with wire rope (or chain or cordage) are of suitable material size and strength to provide adequate safety protection. Attachments must be properly installed and must have a Working Load Limit at least equal to the product with which they are used. Remember: Any chain is only as strong as its weakest link.

### Raised Loads

#### Keep out from under a raised load.

Take notice of the recommendation from the Safety Council Accident Prevention Manual concerning all lifting operations:

"All employees working at cranes or hoists or assisting in hooking or arranging a load should be instructed to **keep out from under the load.** From a safety standpoint, one factor is paramount:

Conduct all lifting operations in such a manner, that if there were an equipment failure, no personnel would be injured. This means **keep out from under a raised load and keep out of the line of force of any load.**"

#### Do not operate a load over people. Do not ride on loads.

### Shock Loads

Avoid impacting, jerking or swinging of load as the Working Load Limit could be exceeded and the Working Load Limit will not apply. A shock load is generally significantly greater than the static load. **Avoid shock loads.**



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## Regular Inspections


Inspect products regularly for visible damage, cracks, wear, elongation, rust, etc. **Protect all products from corrosion.** The need for periodic inspections cannot be overemphasized. **No product can keep operating at its rated capacity indefinitely.** Periodic inspections help determine when to replace a product and reduce rigging hazards. **Keep inspection records** to help pinpoint problems and to ensure periodic inspection intervals.

Due to the diversity of the products involved and uses to which they can be put, it would be counterproductive to make blanket recommendations for inspection procedures and frequency. Best results will be achieved when qualified personnel base their decisions on information from rigging and engineering manuals and on experience from actual use in the field. **Refer to sources listed in T.O.C. > ADDITIONAL REFERENCE MATERIAL > TECHNICAL SAFETY AND INFORMATION SOURCES for technical literature.**

**Frequency of inspection** will depend on environmental conditions, application, storage of product prior to use, frequency of use, etc. **When in doubt, inspect products prior to each use.** Carefully check each item for wear, deformation, cracks or elongation - a sure sign of imminent failure. Immediately withdraw such items from service.

**Rust damage is another potential hazard.** When in doubt about the extent of corrosion or other damage, withdraw the items from service.

**Destroy, rather than discard, items that have been judged defective.** They might be used again by someone not aware of the hazard involved.

Additional warnings and information on wire rope, chain, cordage, blocks and tools can be found in the Table of Contents by clicking on the warning symbol icon (  ). These should be read and understood thoroughly before using a particular item.

## DEFINITIONS

Information contained in this catalog is subject to change; all weights and dimensions are approximate. Ratings are stated in short tons (2,000lbs.) or pounds. All dimensions are in inches; all weights are in pounds, unless stated otherwise.

### Working Load Limit (WLL)

The Working Load Limit is the maximum load which should ever be applied to the product, even when the product is new and when the load is uniformly applied - straight line pull only. **Avoid side loading.** All catalog ratings are based upon usual environmental conditions and consideration must be given to unusual conditions such as extreme high or low temperatures, chemical solutions or vapors, prolonged immersion in salt water, etc. **Never** exceed the Working Load Limit.

### Proof Test Load (Proof Load)

The term "Proof Test" designates a quality control test applied to the product for the sole purpose of detecting defects in material or manufacture. The Proof Test Load (usually twice the Working Load Limit) is the load which the product withstood without deformation when new and under laboratory test conditions. A constantly increasing force is applied in direct line to the product at a uniform rate of speed on a standard pull testing machine. The Proof Test Load does not mean the Working Load Limit should ever be exceeded.

### Breaking Strength/Ultimate Strength

Do not use breaking strength as a criterion for service or design purposes. Refer to the Working Load Limit instead.

Breaking Strength is the average force at which the product, in the condition it would leave the factory, has been found by representative testing to break, when a constantly increasing force is applied in direct line to the product at a uniform rate of speed on a standard pull testing machine. Proof testing to twice the Working Load Limit does not apply to hand-spliced slings.

**Remember:** Breaking Strengths, when published, were obtained under controlled laboratory conditions.

Listing of the Breaking Strength does not mean the Working Load Limit should ever be exceeded.

### Design Factor (sometimes referred to as safety factor)

An industry term usually computed by dividing the catalog Breaking Strength by the catalog Working Load Limit and generally expressed as a ratio. For example: 5 to 1.

### Shock Load

A load resulting from rapid change of movement, such as impacting, jerking or swinging of a static load. Sudden release of tension is another form of shock loading. Shock loads are generally significantly greater than static loads. Any shock loading must be considered when selecting the item for use in a system.

**Avoid shock loads as they may exceed the Working Load Limit.**



# WORKING LOAD LIMITS

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## FURTHER EXPLANATIONS AND CAUTIONS IF LIFTING ANGLES ARE INVOLVED

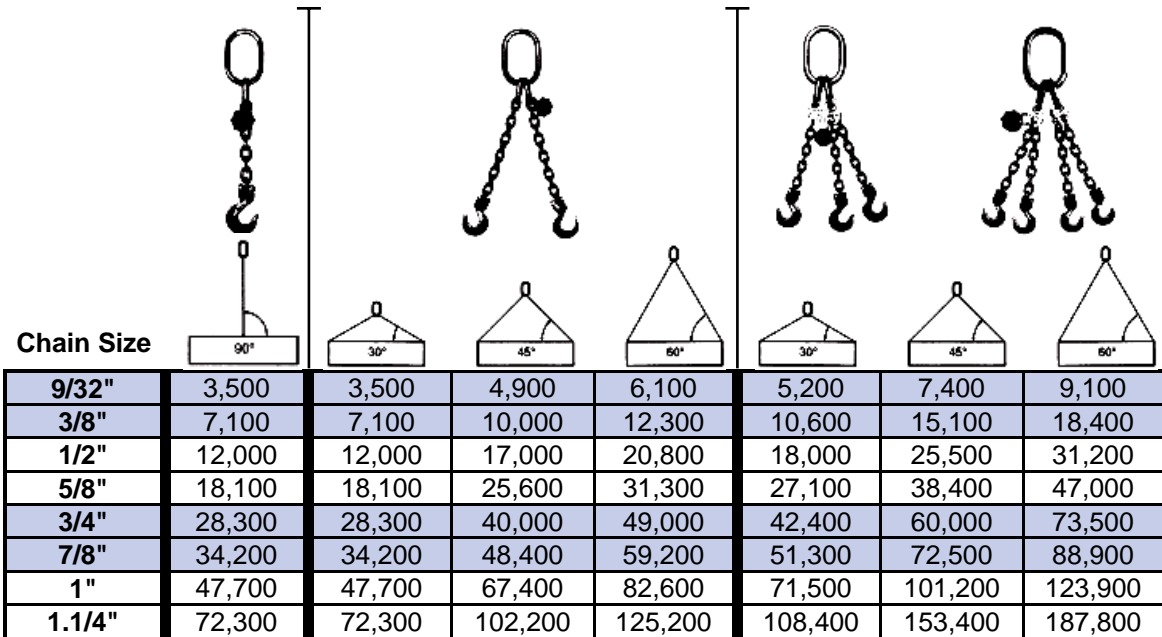
Numerical values published for Breaking Strength and Working Load Limit in the catalog are very specific in one point: They refer to straight, in-line pull or force and are obtained under laboratory conditions.

There are, however, many applications where a straight line pull is not possible or even desirable. When a tackle block system is reeved, wire rope may be bent over many sheaves; multiple leg wire rope or chain slings involve differing lifting angles; angular loads on shackles or eyebolts alter Working Load Limits of the equipment used.

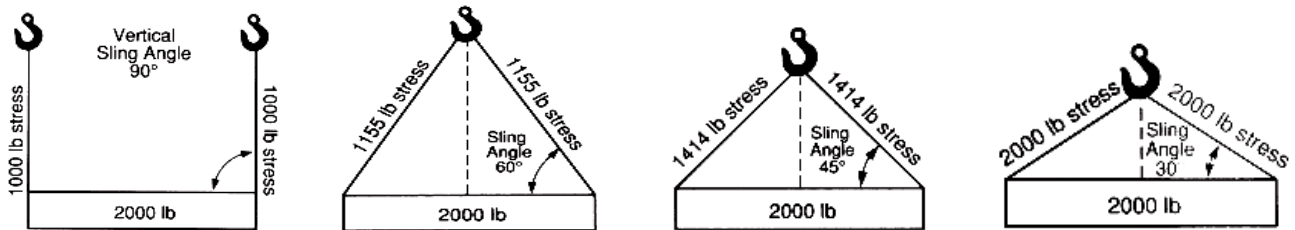
All these and other factors influencing the Working Load Limit must be taken into account when systems are designed and used. The following examples and tables are intended to highlight and demonstrate the effects of angles on the Working Load Limit.

## CHAIN SLINGS, Fabricated entirely from grade 80 alloy components.

### WORKING LOAD LIMITS - POUNDS



### EFFECT OF ANGLES ON SLING CAPACITIES



The rated capacity of a multiple leg sling is directly affected by the angle of the sling leg with the load. As this angle decreases, the stress on each leg increases with the same load. If the sling angle is known, the capacity can be readily determined by multiplying the sling's vertical capacity by the appropriate load angle factor from the table at right.

Sling Angle	Load Angle Factor
90° (vertical)	1
75°	.966
60°	.866
45°	.707
30°	.5

**Example:** A multiple leg sling with a rated capacity of 2000 lb. will have a reduced capacity of 1000 lb. (2000 x .500) when sling legs are at an angle of 30° with the load.



# CHAIN

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### **Refer to warnings in T.O.C. > GENERAL WARNINGS.**

These warnings also apply chain and chain assemblies. Only additional warnings and information are listed below.

### **Never exceed the Working Load Limit of the chain.**

The Working Load Limit is the maximum load that should ever be applied to the chain, even when new and when the load is uniformly applied. Working Load Limit applies only to straight line pulls. When using multiple leg chain slings, the Working Load Limit of each leg will have to be reduced considerably depending on the angle of the sling legs. See **T.O.C. > CHAIN** ⚠ for further discussion. Consult industry recommendations for information, such as ASME B 30.9.

When in doubt as to the Working Load Limit of the chain, refer to the periodic, permanently embossed grade marking on chain links. Proof Coil Chain is identified by P.C. or 30 or 3 or 28; HighTest Chain by H.T. or 43 or 40 or 4; Transportation Chain by 70 or 7; Alloy Chain by 80 or 8 or 800.

### **Use only alloy chain for overhead lifting.**

Grade 80 alloy chain is the only type of chain which can be used for overhead lifting. Use only grade 80 alloy fittings for overhead lifting.

### **Attachments must have at least the same Working Load Limit as the chain used.**

Hooks, links, shackles, etc. must be of suitable material and strength to provide adequate safety protection.

### **Keep out from under a raised load.**

Do not move load over people. Do not ride on load. Conduct all lifting operations in such a manner that if equipment were to fail or break, no personnel would be injured. This means **KEEP OUT FROM UNDER A RAISED LOAD, DO NOT OPERATE LOADS OVER PEOPLE AND KEEP OUT OF THE LINE OF FORCE.**

### **Avoid shock loads.**

Avoid impacting, jerking or swinging of load. Working Load Limit will not apply in these circumstances because a shock load is generally significantly greater than the static load.

### **Inspect chain frequently.**

No product can keep operating at its rated capacity indefinitely. Closely examine each link for deformation, cracks, elongation, corrosion, rust, etc. Take chain out of service even if only one bad link is found. Eliminate twists and kinks in chain before using. Do not attempt to repair damaged or worn links in a chain. Do not attempt to weld, anneal, heat treat or hot galvanize alloy chain - its capacity will be completely destroyed. Protect chain from corrosion.

### **Destroy, rather than discard, chain that is judged to be defective.**

Chain that is not destroyed might be used again by someone not aware of the hazard associated with that use. Destroying chain is best done by cutting it up into short pieces.

### **Chain Slings.**

Only grade 80 alloy chain can be used for overhead lifting.

Refer to OSHA standard 1910.184 and ASME standard B30.9 for design factors and other important information. Other standards and information may apply depending on specific use.

Consult the sources listed in **T.O.C. > ADDITIONAL REFERENCE MATERIAL > TECHNICAL SAFETY AND INFORMATION SOURCES** for additional information.