



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.



SNATCH BLOCKS

CAUTION: NEVER EXCEED THE WORKING LOAD LIMIT

Read important information below and also in T.O.C. > GENERAL WARNINGS.
READ THE FOLLOWING WARNINGS AND SAFETY INFORMATION CAREFULLY.
EVEN EXPERIENCED PERSONNEL NEED TO UNDERSTAND THIS INFORMATION.
Failure to follow warnings and instructions can result in serious injury or death.

SNATCH BLOCKS Safety, Use, and Maintenance Information



To avoid serious injury, death, or property damage -

- Always design and rig snatch block systems so that the load will not slip or fall.
- Always design the lifting system with appropriate sheave assembly material to prevent premature sheave, bearing or wire rope wear and failure.
- Always have a qualified person (as defined by ANSI/ASME B.30) rig the snatch block system.
- Instruct workers to keep hands and body away from the block sheaves, swivels, and "pinch points" where wire rope makes contact with block parts or loads.
- Do not side load snatch blocks - side loading exerts additional force or loading which the snatch block is not designed to accommodate.
- Instruct workers to be alert and to wear appropriate safety gear in areas where loads are moved or supported with snatch block systems.
- Always make sure the hook (and not the latch) supports the load.
- Do not weld snatch blocks or load supporting parts.
- Keep out from under a raised load and stay out of the line of force.
- Never lift personnel with a hook snatch block.
- Remove from service any snatch block that is cracked or deformed.
- Always regularly inspect, lubricate, and maintain snatch blocks.

General Precautions

Ratings shown are applicable only to new or "like new condition" products. Working Load Limit ratings indicate the greatest force or load a product can carry under usual environmental conditions. Shock loading and extraordinary conditions must be taken into account.

The Working Load Limit or Design (Safety) Factor may be affected by wear, misuse, overloading, corrosion, deformation, intentional alteration, and other use conditions. Regular inspection must be conducted to determine whether use can be continued at the catalog assigned WLL, a reduced WLL, a reduced Design (Safety) Factor, or withdrawn from service.



Definitions

Design (Safety) Factor: An industry term denoting a product's theoretical reserve capability; usually computed by dividing the catalog Ultimate Load by the Working Load Limit. Generally expressed for blocks as a ratio of 4 to 1.

Proof Load: The average force applied in the performance of a proof test; the average force which a product may be subjected before deformation occurs.

Proof Test: A test applied to a product solely to determine non-conforming material or manufacturing defects.

Shock Load: A force that results from the rapid application of a force (such as impacting and/or jerking) or rapid movement of a static load. A shock load significantly adds to the static load.

Snatch Block: An assembly consisting of a sheave(s), side plates, and generally an end fitting (hook, shackle, etc.) that is used for lifting, lowering, or applying tension.

Static Load: The load resulting from a constantly applied force or load.

Working Load: The maximum mass or force which the product is authorized to support in a particular service.

Working Load Limit: 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 center line of the product. This term is used interchangeably with the following terms: (1) WLL, (2) Rated Load Value (RLV), (3) Safe Working Load (SWL), and/or (5) Resultant Safe Working Load (RSWL).

Ultimate Load: The average load or force at which the product fails, or no longer supports the load.

Select the Correct Snatch Block

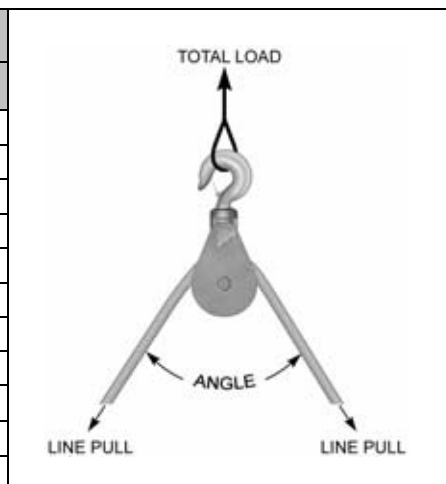
In general, the products displayed are used as parts of a system being employed to accomplish a task. Therefore, we can only recommend the snatch block(s) to be used within the Working Load Limits, or other stated limitations.

It is necessary to determine the total load being imposed on each block in the system to properly determine the rated capacity block to be used. A single sheave block used to change load line direction can be subjected to total loads greatly different from the weight being lifted or pulled. The total load value varies with the angle between the incoming and departing lines to the block. Thus, there are several critical steps to selecting a correct snatch block for a given application including: (1) identify the weight of the load to be lifted or moved; (2) determine the total load on each block in the system; and (3) determine sheave size & wire rope strength.

1. Identify the Weight of the Load to be Lifted or Moved
2. Determine the Total Load on Each Block in the System

Use the following chart to identify the factor to be multiplied by the line pull to obtain the total load on the block.

Angle Factor Multiplier			
Angle	Factor	Angle	Factor
0°	2.00	100°	1.29
10°	1.99	110°	1.15
20°	1.97	120°	1.00
30°	1.93	130°	.84
40°	1.87	135°	.76
45°	1.84	140°	.68
50°	1.81	150°	.52
60°	1.73	160°	.35
70°	1.64	170°	.17
80°	1.53	180°	.00
90°	1.41	-	-



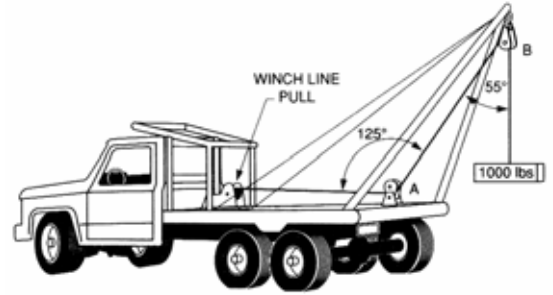


Example

Calculations for determining a total load value on a single line system (a gin pole truck lifting 1,000 lbs.). There is no mechanical advantage to a single part load line system, so winch line pull is equal to 1,000 lbs. or the weight being lifted.

To determine total load on Block A:
A = 1,000 lbs. x 1.81 = 1,810 lbs.
 (line pull) (factor 50° angle)

To determine total load on Block B:
B = 1,000 lbs. X .76 = 760 lbs.
 (line pull) (factor 135° angle)



3. Determine Sheave Size & Wire Rope Strength

Strength Efficiency

Flexing wire rope reduces its strength. To account for the effect of bend radius on wire rope strength when selecting a sheave, use the following table:

$$\text{Ratio A} = \frac{\text{Sheave Diameter}}{\text{Rope Diameter}}$$

Example

To determine the strength efficiency of 1/2" diameter wire rope using a 10" diameter sheave:

$$\text{Ratio A} = \frac{10" \text{ (sheave diameter)}}{1/2" \text{ (wire rope diameter)}} = 20$$

Refer to Ratio A of 20 in the table, then check the column under the heading "Strength Efficiency Compared to Catalog Strength in %" ... 91% strength efficiency compared to the catalog strength of wire rope.

Ratio A	Strength Efficiency Compared to Catalog Strength in %
40	95
30	93
20	91
15	89
10	86
8	83
5	79
4	75
2	65
1	50

Fatigue Life

Repeated flexing and straightening of wire rope causes a cyclic change of stress called "fatiguing." Bend radius affects wire rope fatigue life. A comparison of the relative effect of sheave diameter on wire rope fatigue life can be determined as shown below:

$$\text{Ratio B} = \frac{\text{Sheave Diameter}}{\text{Rope Diameter}}$$

$$\text{Relative Fatigue Bending Life (RFBL)} = \frac{\text{RFBL (Sheave 1)}}{\text{RFBL (Sheave 2)}}$$

Example

To determine the extension of fatigue life for a 3/4" wire rope using a 22.5" diameter sheave versus a 12" diameter sheave:

$$\text{Ratio B} = \frac{12" \text{ (sheave diameter)}}{3/4" \text{ (wire rope diameter)}} = 30$$

$$\text{Ratio B} = \frac{22.5" \text{ (sheave diameter)}}{3/4" \text{ (wire rope diameter)}} = 16$$

Ratio B	Relative Fatigue Bending Life
30	10.0
25	6.6
20	3.8
18	2.9
16	2.1
14	1.5
12	1.1

The relative fatigue bending life for a Ratio B of 16 is 2.1 (see above table) and Ratio B of 30 is 10.

Relative Fatigue Bending Life = 10/2.1 = 4.7

Therefore, we expect extension of fatigue life using a 22.5" diameter sheave to be 4.7 times greater than that of a 12" diameter sheave.



Inspect & Maintain Fittings and Snatch Blocks Regularly

Fittings

Fitting, including hooks, shackles, links, etc. may become worn and disfigured with use, corrosion, and abuse resulting in nicks, gouges, worn threads and bearings, sharp corners which may produce additional stress conditions and reduce system load capacity.

Grinding is the recommended procedure to restore smooth surfaces. The maximum allowance for reduction of a product's original dimension due to wear or repair before removal from service is:

1. Any single direction: no more than 10% of original dimension;
2. Two directions: no more than 5% of each dimension.

For detailed instructions on specific products, see the application and warning information for that product. Any greater reduction may necessitate a reduced Working Load Limit. **Any crack or deformation in a fitting is sufficient cause to withdraw the snatch block from service.**

Snatch Block

Snatch blocks must be regularly inspected, lubricated, and maintained for peak efficiency and extended usefulness. Their proper use and maintenance is equal in importance to other mechanical equipment. The frequency of inspection and lubrication is dependent upon frequency and periods of use, environmental conditions, and the user's good judgment.

Inspection: At a minimum, the following should be inspected, repaired if possible, and removed from service if necessary:

1. Wear on pins or axles, rope grooves, side plates, bushings, and fittings. Excessive wear may be a cause to replace parts or remove block or sheave from service.
2. Deformation in side plates, pins and axles, fitting attachment points, trunnions, etc. Deformation can be caused by abusive service and/or overload and may be a cause to remove block or sheave from service.
3. Misalignment or wobble in sheaves.
4. Security of nuts, bolts, and other locking methods, especially after reassembly following a tear down inspection. Original securing method should be used; e.g., staking, set screw, cotter pin, cap screw.
5. Pins retained by snap rings should be checked for missing or loose rings.
6. Sheave pin nuts should be checked for proper positioning.
7. Deformation or corrosion of hook and nut threads.
8. Surface condition and deformation of hook (see "Fitting Maintenance" and ANSI 830.10.)
9. Hook latch for deformation, proper fit and operation.
10. Remove from service any bushings with cracks on inside diameter or bushing end. Bushings that are cracked and/or extended beyond sheave hub are indications of bushing overload.

Lubrication

The frequency of lubrication depends upon frequency and period of snatch block use as well as environmental conditions, which are contingent upon the user's good judgment. Assuming normal product use, bronze bushings (not self lubricating) should be lubricated using a lithium-based grease of medium consistency every 8 hours for continuous operation or every 7 days for intermittent operation.

Further Information

Please refer to OSHA Rule 1926.550(g) for personnel hoisting by cranes and derricks, and OSHA Directive CPL 2-1.29 - "Interim Inspection Procedures During Communication Tower Construction Activities" for specific information regarding using snatch block systems for these applications.