SECTION 1

Wire Rope

NOTES

Wire Rope 101

What Wire Rope Is...

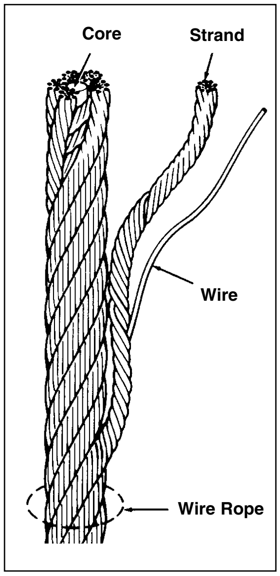
A wire rope is a piece of flexible, multi-wired, stranded machinery made of many precision parts.

Usually a wire rope consists of a core member, around which a number of multi-wired strands are “laid” or helically bent. There are two general types of cores for wire rope - fiber cores an wire cores. The fiber core may be made from natural or synthetic fibers. The wire core can be an Independent Wire Rope Core (IWRC), or a Strand Core (SC).

The purpose of the core is to provide support and maintain the position of the outer strands during operation.

Any number of multi-wired strands may be laid around the core. The most popular arrangement is six strands around the core, as this combination gives the best balance.

The number of wires per strand may vary from 3 to 91, with the majority of wire ropes failing into the 7-wire, 19-wire, or 37-wire strand categories.

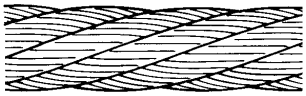


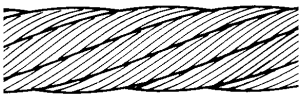
The “lays” of Wire Rope

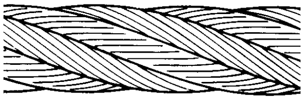
“Lay” of a wire rope is simply a description of the way wires and strands are placed during construction. Right lay and left lay refer to the direction of strands. Right lay means that the strands pass from left to right across the rope. Left lay means just the opposite: strands pass from right to left.

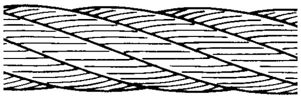
Regular lay and lang lay describe the way wires are placed within each strand. Regular lay means that wires in the strands are laid opposite in direction to the lay of the strands. Lang lay means that wires are laid in the same direction as the lay of the strands.

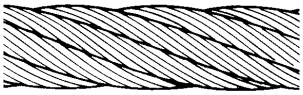
Most of the wire rope used is right lay, regular lay. This specification has the widest range of applications and meets the requirements of most equipment. In fact, other lay specifications are considered exceptions and must be requested when ordering.


Left Lay REGULAR LAY


Left Lay LANG LAY


Right Alternate Lay


Right Lay REGULAR LAY


Right Lay LANG LAY

Here are some exceptions

Lang lay is recommended for many excavating, construction, and mining applications, including draglines, hoist lines, dredgelines and other similar lines. Here's why: Lang lay ropes are more flexible than regular lay ropes. They also have greater wearing surface per wire than regular lay ropes.

Where properly recommended, installed and used, lang lay ropes can be used to greater advantage than regular lay ropes. However, lang lay ropes are more susceptible to the abuses of bending over small diameter sheaves, pinching in undersize sheave grooves, crushing when winding on drums, and failing due to excessive rotation. Left lay rope has greatest usage in oil fields on rod and tubing lines, blast hole rigs, and spudders where rotation of right lay rope would loosen couplings. The rotation of a left lay rope tightens a standard coupling.

Wire Rope Design & Construction

Wire ropes are composed of independent parts–wires, strands and cores-that continuously interact with each other during service.

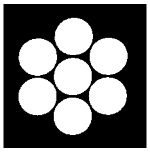
Wire rope engineers design those parts in differing steel grades, finishes and a variety of constructions to attain the best balance of strength, abrasion resistance, crush resistance, bending fatigue resistance and corrosion resistance for each application.

To select the best wire rope for each application, one must know the required performance characteristics for the job and enough about wire rope design to select the optimum combination of wire rope properties.

The following information is presented as a basic guide. Hanes Supply engineers and field service specialists are available to provide more specific recommendations.

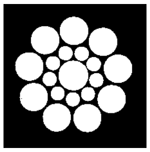
Strand Constructions

Strands are designed with various combinations of wires and wire sizes to produce the desired resistance to fatigue and abrasion. Generally, a small number of large wires will be more abrasion resistant and less fatigue resistant than a large number of small wires.



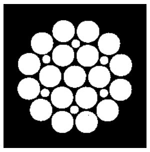
Single Size

The basic strand construction has wires of the same size wound around a center.



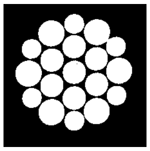
Seale

Large outer wires with the same number of smaller inner wires around a core wire. Provides excellent abrasion resistance but less fatigue resistance. When used with an IWRC, it offers excellent crush resistance over drums.



Filler Wire

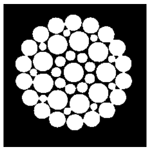
Small wires fill spaces between large wires to produce crush resistance and a good balance of strength, flexibility and resistance to abrasion.

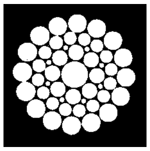


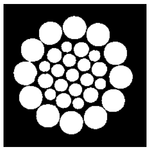
Warrington

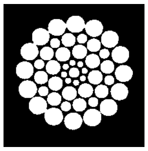
Outer layer of alternately large and small wires provides good flexibility and strength but low abrasion and crush resistance.

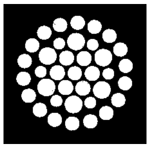
Many commonly used wire ropes use combinations of these basic constructions.


Seale Filler Wire


Filler Wire Seale


Warrington Seale


Seale Warrington Seale



Multiple Operation

One of the above strand designs may be covered with one or more layers of uniform-sized wires.

Finish

Bright finish is suitable for most applications. Galvanized finish is available for corrosive environments. Plastic jacketing is also available on some constructions.

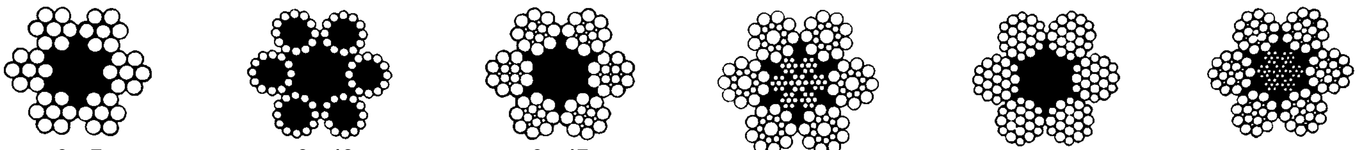
Wire Grades

The most common steel wire grades are: IPS (Improved Plow Steel), EIP (Extra Improved Plow Steel) and EEIP (Extra Extra Improved Plow Steel). Stainless Steels and other special grades are provided for special applications.

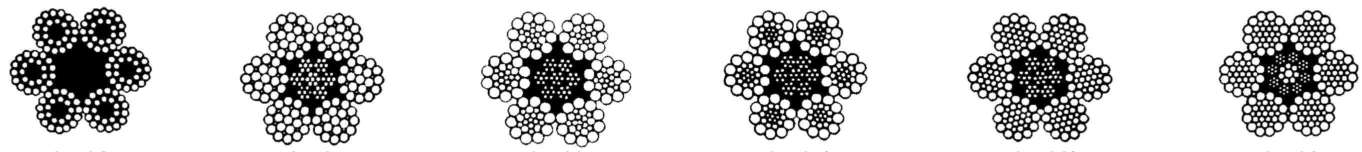
Most wire ropes are made with round wires. Both triangular and shaped wires are also used for special constructions. Generally, the higher the strength of the wire, the lower its ductility will be.

Wire Rope 101

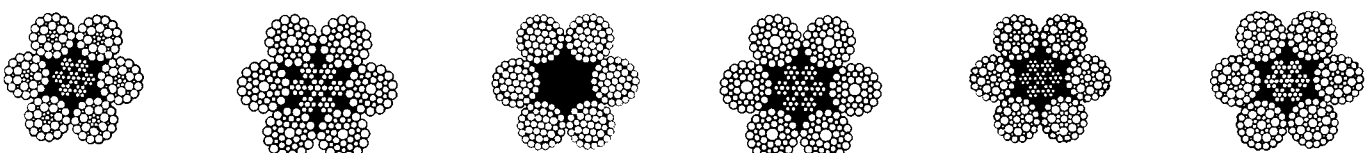
Wire Rope Cross Sections (past & present)



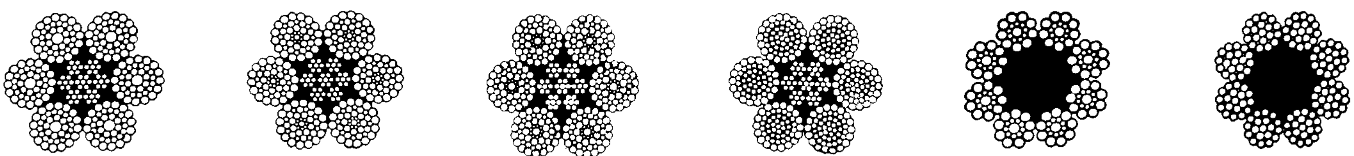
6 x 7 Poly Core | **6 x 12** (Marine Rope) | **6 x 17** Filler Wire | **6 x 19** Seale | **6 x 19** Warrington | **6 x 21** Filler Wire



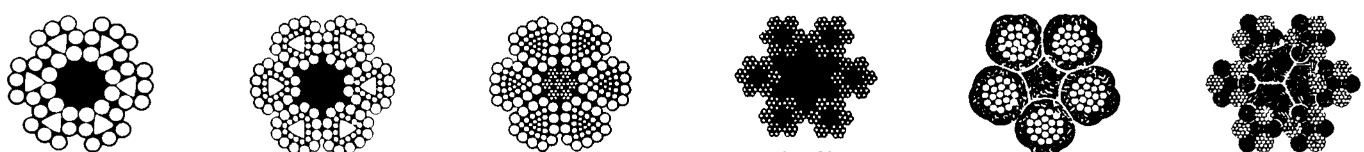
6 x 24 (Mooring Line) | **6 x 25** Filler Wire | **6 x 26** Warrington-Seale | **6 x 27*** Seale | **6 x 31*** Filler Wire | **6 x 31** Warrington-Seale



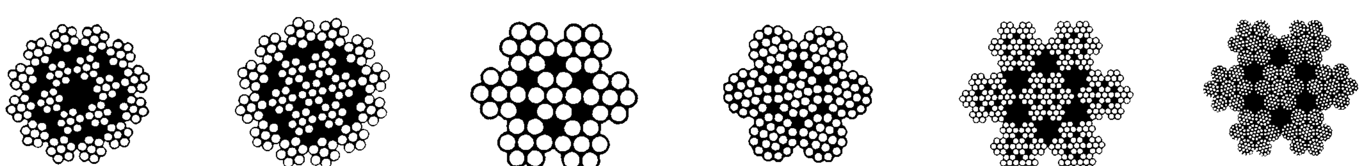
6 x 36 Filler Wire | **6 x 36** Warrington-Seale | **6 x 37*** Warrington | **6 x 41** Warrington-Seale | **6 x 41*** Seale-Filler Wire | **6 x 46** Seale-Filler Wire



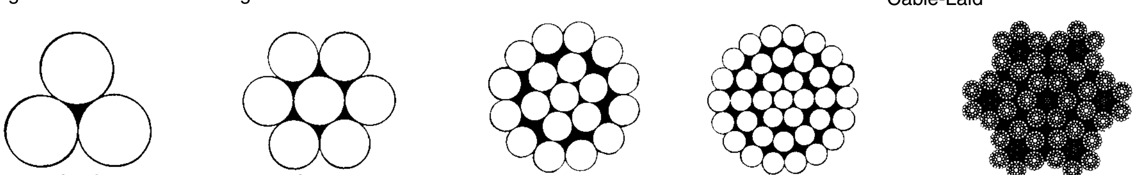
6 x 49* Filler Wire-Seale | **6 x 49** Warrington-Seale | **6 x 55*** Seale-Warrington | **6 x 61*** Filler-Wire Seale | **8 x 19*** Seale | **8 x 25** Filler Wire



6 x 8 Style D Flattened Strand | **6 x 25 Style B** Flattened Strand | **6 x 30 Style G** Flattened Strand | **6 x 42** (Tiller Rope) | **5 x 19*** (Marine Clad Rope) | **6 x 3 x 19** (Spring Lay Rope)



18 x 7 Non-Rotating | **19 x 7** Non-Rotating | **7 x 7** Aircraft Cable | **7 x 19** Aircraft Cable | **7 x 7 x 7** Cable-Laid | **7 x 7 x 19** Cable-Laid

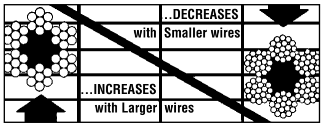


1 x 3 Strand | **1 x 7** Strand | **1 x 19** Strand | **1 x 37** Strand | **7 x 6 x 41** IWRC Cable-Laid

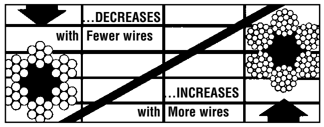
* Not readily available any longer

Wire Rope 101

Abrasion Resistance



Fatigue Resistance



Nominal Strengths & Weights

Wire Rope 6 x 19 Class - 6 x 37 Class

Dia. (in)	Nominal Strength (Tons)			Approx. Wt/Ft (lbs)	
	IPS		EIPS		
	Fiber Core	IWRC	IWRC	Fiber Core	IWRC
3/16	1.55	1.67	–	.059	.065
1/4	2.74	2.94	3.40	.105	.116
5/16	4.26	4.58	5.27	.164	.18
3/8	6.10	6.56	7.55	.236	.26
7/16	8.27	8.89	10.2	.32	.35
1/2	10.7	11.5	13.3	.42	.46
9/16	13.5	14.5	16.8	.53	.59
5/8	16.7	17.9	20.6	.66	.72
3/4	23.8	25.6	29.4	.95	1.04
7/8	32.2	34.6	39.8	1.29	1.42
1	41.8	44.9	51.7	1.68	1.85
1-1/8	52.6	56.5	65.0	2.13	2.34
1-1/4	64.6	69.4	79.9	2.63	2.89
1-3/8	77.7	83.5	96.	3.18	3.50
1-1/2	92.0	98.9	114.	3.78	4.16
1-5/8	107.	115.	132.	4.44	4.88
1-3/4	124.	133.	153.	5.15	5.67
1-7/8	141.	152.	174.	5.91	6.50
2	160.	172.	198.	6.72	7.39
2-1/8	179.	192.	221.	7.59	8.35
2-1/4	200.	215.	247.	8.51	9.36
2-3/8	222.	239.	274.	9.48	10.4
2-1/2	244.	262.	302.	10.5	11.6
2-5/8	268.	288.	331.	11.6	12.8
2-3/4	292.	314.	361.	12.7	14.0
2-7/8	317.	341.	393.	13.9	15.3
3	–	370.	425.	–	16.6
3-1/8	–	399.	458.	–	18.0
3-1/4	–	429.	492.	–	19.5
3-3/8	–	459.	529.	–	21.0
3-1/2	–	491.	564.	–	22.6

Available galvanized at 10% lower strengths, or in equivalent strengths on special request

Inspection–The key to longer, safer wire rope use

Any wire rope in use should be inspected on a regular basis. You have too much at stake in lives and equipment to ignore thorough examination of the rope at prescribed intervals.

The purpose of inspection is to accurately estimate the service life and strength remaining in a rope so that maximum service can be had within the limits of safety. Results of the inspection should be recorded to provide a history of rope performance on a particular job. On most jobs wire rope must be replaced before there is any risk of failure. A rope broken in service can destroy machinery and curtail production. It can also kill.

Because of the great responsibility involved in ensuring safe rigging on equipment, the person assigned to inspect should know wire rope and its operation thoroughly. Inspections should be made regularly and the results recorded.

When inspecting the rope, the condition of the drum, sheaves, guards, cable clamps and other end fittings should be noted. The condition of these parts affects rope wear: any defects detected should be repaired.

To ensure rope soundness between inspections, all workers should participate. The operator can be most helpful by watching the ropes under his control. If any accident involving the ropes occurs, the operator should immediately shut down his equipment and report the accident to his supervisor. The equipment should be inspected before resuming operation.

The Occupational Safety and Health Act has made periodic inspection mandatory for most wire rope applications. We can help you locate regulations that apply to most applications, give us a call!

Just looking at the rope Is not enough

When an inspector takes a look at a rope, he may see sections showing excessive wear. By flagging the rope, he can quickly determine where the rope is rubbing or contacting parts of the equipment, and then repair, replace, or modify the condition causing the wear.

Sheave Inspection

Inspection of sheaves is a relatively simple, yet very vital task. A sheave groove gauge, usually obtainable from a wire rope manufacturer, is used to check the grooves in a sheave. Hold the gauge perpendicular to the surface of the groove to observe properly the groove size and contour, as in this illustration.

Nominal Rope Dia. (in)	Allowable Rope oversize (in)	1/2 Allowable Rope Oversize (in)
0 - 3/4	+ 1/32	+ 1/64
13/16 - 1-1/8	+3/64	+3/128
1-3/16 - 1-1/2	+ 1/16	+ 1/32
1-9/16 - 2-1/4	+3/32	+ 3/64
2-5/16 - and larger	+1/8	+1/16

Photo shows new gauge and worn sheave. This new gauge is designed with one-half the allowable oversize (see table). Using the new gauge, when you do not see light, the sheave is OK. When you do see light under the new gauge, the sheave should be replaced.

Sheaves Should be Checked for:

1. Correct groove diameter
2. Roundness or contour to give proper support to the rope
3. Small holes, cracks, uneven surfaces, or other defects that might be detrimental to the rope
4. Extreme deep wear

A sheave should also be checked to make sure it turns freely, is properly aligned, has no broken or cracked flanges, and has bearings that work properly.

Drums should also be inspected for signs of wear that could damage rope.

Plain-faced or smooth drums can develop grooves or impressions that prevent rope from winding properly. Repair by resurfacing the face or replacing the lagging.

Scrubbing will occur if the rope tends to close wind. If the tendency is to open winding, the rope will encounter abnormal abuse as the second layer forces itself down between the open wraps of the first layer on the drum.

Operating with a smooth drum calls for special care. Be sure the rope is always tightly wound and thread layed on the first layer. Any loosening of the line is easily observed as the winding will be bad and the rope will be coming off with a series of “bad spots.”

Grooved drums should be examined for tight or corrugated grooves and for differences in depth or pitch that could damage the second and subsequent layers. Worn grooves can develop extremely sharp edges that shave away small particles of steel from the rope. Correct this condition by grinding or filing a radius to replace the sharp edge.

Drum flanges, as well as the starter, filler and riser strips, should be checked. Excessive wear here often causes unnecessary rope abuse at the change of layers and cross-over points.

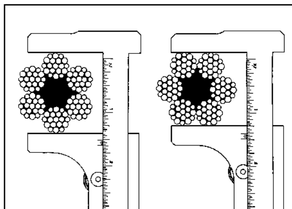
Other places of contact such as rollers, scrub boards, guides and end attachments should also be inspected.

Measure the widest diameter

Ropes and sheave grooves must be precisely fitted to each other to get the most service out of your wire rope dollar. Make measurement of rope diameter a normal part of your inspection program.

There's only one right way to measure rope diameter: use machinist's calipers and be sure to measure the widest diameter. These drawings compare the right way with the wrong way.

This method is not only useful for measuring the diameter of a new rope, but also for determining the amount of wear and compression that has occurred while the rope has been in use. Accurate recording of this information is essential in helping to decide when to replace wire rope.



Right Way. Set the machinist’s caliper to read the widest diameter. Vernier scale reads to 1/128th of an inch.

Wrong Way. This is the wrong way to measure wire rope diameter. Widest diameter is not being read.

Wire Rope 101

Abrasion and Bending

The "X-Chart" - Abrasion Resistance Vs. Bending Fatigue Resistance

While there is a possibility, there is little likelihood that an application can be found for which there is a precisely suitable wire rope–one that can satisfy every indicated requirement.

As with all engineering design problems, feasible solutions demand compromise to some degree. At times, it becomes necessary to settle for less than optimum resistance to abrasion in order to obtain maximum flexibility; the latter being a more important requirement for the given job. A typical example of this kind of trade-off would be in selecting a highly flexible rope on an overhead crane. Conversely, in a haulage installation, a rope with greater resistance to abrasion would be chosen despite the fact that such ropes are markedly less flexible.

Two compelling factors that govern most decisions as to the selection of a wire rope are abrasion resistance, and resistance to bending fatigue. Striking a proper balance with respect to these two important characteristics demands judgment of a very high order. A graphic presentation of just such comparison of qualities between the most widely used rope constructions and others is given by means of X-chart.

Referring to this chart when selecting a rope, the mid-point (at the X) comes closest to an even balance between abrasion resistance and resistance to bending fatigue. Reading up or down along either leg of the X, the inverse relationship becomes more apparent as one quality increases and the other decreases.

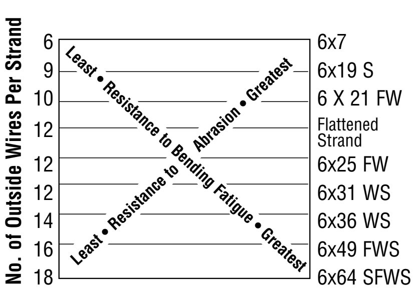
Effect of Sheave Size

Wire ropes are manufactured in a great variety of constructions to meet the varying demands of wire rope usage. Where abrasion is an important factor, the rope must be made of a coarse construction containing relatively large wires. In other cases, the great amount of bending to which the rope is subjected is more important. Here, a more flexible construction, containing many relatively small wires, is required. In either case, however, if the rope operates over inadequate size sheaves, the severe bending stresses imposed will cause the wires to break from fatigue, even though actual wear is slight. The smaller the diameter of the sheave, the sooner these fatigue breaks will occur and the shorter rope life becomes.

Another undesirable effect of small sheaves is accelerated wear of both rope and sheave groove. The pressure per unit area of rope on sheave groove for a given load is inversely proportional to the size of the sheave. In other words, the smaller the sheave the greater the rope pressure per unit area on the groove. Both sheaves and rope life can obviously be prolonged by using the proper diameter sheave for the size and construction of rope.

Sheave diameter can also influence rope strength. When a wire rope is bent around a sheave, there is a loss of effective strength due to the inability of the individual strands and wires to adjust themselves entirely to their changed position. Tests show that rope strength efficiency decreases to a marked degree as the sheave diameter is reduced with respect to the diameter of the rope.

Therefore, it is evident that a definite relationship exists between rope service and sheave size. As a guide to rope users, wire rope manufacturers have established standards for sheave sizes to be used with various rope constructions. To secure the most economical service, it is important that the suggested size of sheaves given here be used.



The Wire Rope industry refers to this as the X-Chart. It serves to illustrate the inverse relationship between abrasion resistance & resistance to bending fatigue in a representative number of the most widely used wire ropes.

Proper Sheave and Drum Sizes

Construction	Suggested D/d* ratio	Min. D/d* ratio
6x7	72	42
19x7 or 18x7 Rotation Resistant	51	34
6x19 Seale	51	34
6x27 H flattened strand	45	30
6x31 V flattened strand	45	30
6x21 filler wire	45	30
6x25 filler wire	39	26
6x31 Warrington Seale	39	26
6x36 Warrington Seale	35	23
8x19 Seale	41	27
8x25 filler wire	32	21
6x41 Warrington Seale	32	21
6x42 tiller	21	14

*D = Tread Diameter of Sheave
d = Nominal Diameter of Rope

Rope Strength Design Factors

The rope strength design factor is the ratio of the rated strength of the rope to its operating stress. If a particular rope has a rated strength of 100,000 lbs. and is working under an operating stress of 20,000 lbs., it has a rope strength design factor of 5. It is operating at one-fifth or 20% of its rated strength.

Many codes refer to this factor as the "Safety Factor" which is a misleading term, since this ratio obviously does not include the many facets of an operation which must be considered in determining safety.

Wire rope is an expendable item - a replacement part of a machine or installation. For economic and other reasons, some installations require ropes to operate at high stresses (low rope strength design factors). On some installations where high risk is involved, high rope strength design factors must be maintained. However, operating and safety codes exist for most applications and these codes give specific factors for usage. When a machine is working and large dynamic loadings (shock loadings) are imparted to the rope, the rope strength design factor will be reduced which could result in overstressing of the rope. Reduced rope strength design factors frequently result in reduced service life of wire rope.

O.S.H.A. (A.N.S.I.) Removal Criteria 5. ANSI Safety Codes, Standards and Requirements–rope must be removed from service when diameter loss or wire breakage occurs as follows:

Diameter Loss

Original Dia. (in)	Loss (in)
5/16 & Smaller	1/64
3/8 – 1/2	1/32
9/16 –3/4	3/64
7/8 – 1-1/8	1/16
1-1/4 – 1-1/2	3/32

No. of Wire Breaks

		No. broken Wires In Running Ropes		No. Broken Wires In Standing Ropes	
ANSI No.	Equipment	In One Rope Lay	In One Strand	In One Rope Lay	At End Connection
B30.2	Overhead & Gantry Cranes	12	4	NS**	NS**
B30.4	Portal, Tower & Pillar Cranes	6	3	3	2
B30.5	Crawler, Locomotive & Truck Cranes	6	3	3	2
B30.6	Derricks	6	3	3	2
B30.7	Base Mounted Drum Hoists	6	3	3	2
B30.8	Floating Cranes & Derricks	6	3	3	2
A10.4	Personnel Hoists	6*	3	2*	2
A10.5	Material Hoists	6*	NS**	NS**	NS**

* Also remove for 1 valley break. OSHA requires monthly record keeping of wire rope condition.

** NS = Not Specified

Note: Current industry recommendations & OSHA standards based upon the use of steel sheaves. The manufacturer of plastic or synthetic sheaves or liners should be consulted to their recommendation on the safe application of their product, and possible revision in rope inspection criteria when used with their product.

Block Twisting

Block twisting or "cabling" is one of the most frequently encountered wire rope problems in the construction field. When this problem occurs, the wire rope is most often blamed, and other equally important factors in the operation are overlooked.

Personnel experienced with handling of wire rope know that conventional wire ropes will twist or unlay slightly, when a load is applied. In a reeved hoisting system, subjected to loading and unloading, such as a load hoisting line, this results in block twisting and possibly distortion of the wire rope. Cabling of the block most frequently occurs as the load in the wire rope is released, and the "falls" are in a lowered position. Cabling may be considered as the twisting of the block beyond one-half of a revolution (180° twisting) of the traveling block. When this condition occurs, the operator shows good judgment in not making additional lifts, until the conditions causing the problem are corrected.

The following machine and site conditions should be investigated for possible improvement in block twisting.

Wire Rope 101

Block Twisting (cont.)

1. Reduce wire rope length. Longer rope lengths cause more twisting than short rope lengths. This applies particularly to the amount of wire rope in the "falls."

2. Reduce the amount of load lifted. Heavily loaded ropes have more torque and twist than lightly loaded ropes. This condition would also apply to the speed of loading or "shock" loading, since this condition also causes higher wire rope loading.

3. Eliminate "odd-part" reeving, where the wire rope "dead-end" is on the traveling block. Wire rope torque, from the application of load, is greatest at the rope dead-end.

4. Relocate the rope dead-end at the boom, in order to increase the separation between the dead-end and the other rope parts. This applies a stabilizing load directly to the traveling block. The original equipment manufacturer should be consulted before making this modification.

5. Increase sheave size. This increases the amount of separation between wire rope parts and may improve the situation by applying stabilizing loads and reducing the amount of rope torque transmitted to the traveling block.

6. Restrain the twisting block with a "tag" line. One or more of the foregoing suggestions may eliminate the problem without resorting to "specialized" wire rope which may not only be difficult to locate but expensive as well.

The use of special "rotation resistant" wire ropes will not likely be required unless the intended length of rope "falls" exceeds 100 feet, or the length of the load hoisting line exceeds 600 feet. In the event these latter conditions exist, the user should also anticipate using a combination of the "rotation resistant" wire rope and the foregoing field suggestions for the more severe problems.

Common Wire Rope Abuses

Neglect and abuse are the two chief enemies of wire rope life. One costly form of neglect is lack of proper field lubrication. Abuse takes many forms: improper reeling or unreeling, wrong size or worn sheaves, improper storage, bad splicing are a few.

Condition of Machinery

Wire rope performance depends upon the condition of the equipment on which it operates; poorly maintained equipment will usually result in reduced rope life.

Effects of Shock-Loading and Vibration

The destructive effects of jerking or shock-loading are visually noticeable. Vibration has somewhat the same effect, and is equally destructive. An individual shock may be slight but many rapidly repeated slight shocks can have the effect of several large shocks.

Vibration which occurs directly above a load is often unavoidable. "Whipping" of the section of rope immediately above the load is also common. In these cases, rapid wire fatigue is possible. For reasons of safety, this section should be examined regularly.

Wire rope failure is usually cumulative. Each repeated overstress brings the rope nearer to failure. Thus, a wire rope may become fatigued to a point close to failure under a heavy load and actually fail under a much lighter load.

Overstressing

In any hoisting operation, there should be no slack in the wire rope when the load is applied. Otherwise, the resulting stress will be excessive.

Overstressing can also be the result of too-rapid acceleration or deceleration. Wire rope will withstand considerable stress if the load is applied slowly. As with ordinary twine, a quick snap will cause overstressing and breakage. This applies both when starting to lift a load, and when bringing it to a stop.

Corrosion

Corrosion can seriously shorten wire rope life, both by metal loss and by formation of corrosion pits in the wires. These pits act as stress-concentration points in the wires in much the same manner as do nicks.
Wire rope left on machines shut down for long periods of time deteriorates rapidly. To preserve the rope for future use, it should be removed, cleaned and thoroughly lubricated.

Causes of Corrosion Damage

Pitting, erosion, and surface effects of many different types can all result in corrosion damage. Because they tend to increase corrosion, the following conditions should be considered and noted when applicable, during the ordering of wire rope - acid and alkaline solutions, gases, fumes, brine and salt air, sulphurous compounds, and high humidity and temperature. Lubricants are readily available to reduce the severity of attack of most of these conditions.

Effects of Severe Heat

Where wire rope is subjected to severe heat (e.g., foundry cranes) it will not give the service expected because it will deteriorate more quickly.

Wire ropes exposed to hot-metal handling or other extreme heat sometimes require independent wire rope cores.

Shifting Ropes From One Job to Another

Sometimes an idle wire rope from one operation is installed on another to keep the rope in continuous service. This extremely poor practice is an expensive "economy."

Because wire rope tends to "set" to the conditions of its particular operating job, the differing bends, abrasions, and stresses of a new operation can produce premature failure. Therefore, for maximum life and efficiency, a rope should be used only on the job for which it has been specified.

Machinery Operation

Some operators are harder on their machinery than others and as a result they get shorter rope life. In certain instances, enough extra work is done to more than offset the additional wear-and-tear on equipment and wire rope. The operation may be more efficient from the production standpoint as a result, but those in charge of rope purchases should be made aware of the probable reduction in rope life and increased rope costs.

Examples of Common Wire Rope Abuses

Crushing. Because of loose winding on drum, rope was pulled in between underlying wraps and crushed out of shape.

Too sudden load release. The sudden release of a load cause birdcaging. Here individual strands open away from each other, displacing the core.

Lack of lubrication. Premature breakage of wires resulted from "locking" of strands, which was caused by insufficient lubrication.

Infrequent Inspection. Neglect of periodical inspection left this rope in service too long, resulting in considerable abrasion.

Improper handling. Kink or "dog leg" was caused by improper handling and/or installation. A kink causes excessive localized or spot abrasion.

Reverse bending. Running this rope over one sheave and under another caused fatigue breaks in wires.

Excessive exposure to elements. Too much exposure combined with surface wear and loss of lubrication caused corrosion and pitting.

Too long in service. Repeated winding and overwinding of this rope on a drum while it was under heavy stress caused the unusually severe wear shown.

Undersize sheave grooves. Sheaves were too small, causing strands to pinch. Wires then fail in the valley between the strands.

Poor work procedures. Damage to strands and wires resulted from electric arcing.

Lack of knowledge. Here's what occurs when a loop which has been "pulled through" and tightened remains in service.

Wire Rope 101

Physical Properties

Elastic Properties of Wire Rope

The following discussion relates to conventional 6- or 8-strand ropes that have either fiber or steel cores; it is not applicable to rotation-resistant ropes since these constitute a separate case.

Wire rope is an elastic member; it stretches or elongates under load. This stretch derives from two sources:

1) constructional

2) elastic

In actuality, there may be a third source of stretching–a result of the rope rotating on its own axis. Such elongation, which may occur either as a result of using a swivel, or from the effect of a free-turning load, is brought about by the unlaying of the rope strands. Because the third source is a subject that is beyond the scope of this publication, discussion will be directed to constructional and elastic stretch.

Constructional Stretch

When a load is applied to wire rope, the helically-laid wires and strands act in a constricting manner thereby compressing the core and bringing all the rope elements into closer contact. The result is a slight reduction in diameter and an accompanying lengthening of the rope.

Constructional stretch is influenced by the following factors:

1) type of core (fiber or steel),

2) rope construction (6x7, 6x25 FW, 6x41 WS, 8x19 S, etc.),

3) length of lay,

4) material.

Ropes with wire strand core (WSC) or independent wire rope core (IWRC) have less constructional stretch than those with fiber core (FC). The reason for this is the fact that the steel cannot compress as much as the fiber core.

Usually, constructional stretch will cease at an early stage in the rope's life. However, some fiber core ropes, if lightly loaded (as in the case of elevator ropes), may display a degree of constructional stretch over a considerable portion of their life.

A definite value for determining constructional stretch cannot be assigned since it is influenced by several factors. The following table gives some idea of the approximate stretch as a percentage of rope under load.

Rope Construction	Approx. Stretch*
6 strand FC	1/2% - 3/4%
6 strand IWRC	1/4 % - 1/2%
8 strand FC	3/4% - 1%

* Varies with the magnitude of the loading.

Elastic Stretch

Elastic stretch results from recoverable deformation of the metal itself. Here, again, a quantity cannot be precisely calculated. However, the following equation can provide a reasonable approximation for a good many situations.

$$\text{Changes in length (ft)} = \frac{\text{Change in load (lb)} \times \text{Length (ft)}}{\text{Area (inches}^2\text{)} \times \text{Modulus of Elasticity (psi)}}$$

The modulus of elasticity is given below.

Approximate Modulus of Elasticity (lbs. per square Inch)

Rope Classification	Zero through 20% Loading	21 to 65% Loading*
6 x 7 with fiber core	11,700,000	13,000,000
6 x 19 with fiber core	10,800,000	12,000,000
6 x 37 with fiber core	9,900,000	11,000,000
8 x 19 with fiber core	8,100,000	9,000,000
6 x 19 with IWRC	13,500,000	15,000,000
6 x 37 with IWRC	12,600,000	14,000,000

* Applicable to new rope, i.e., not previously loaded.

General Guidelines for Wire Rope Selection

Strength:

Wire rope must have the strength required to handle the maximum load plus a design factor.

The design factor is the ratio of the breaking strength of the rope to the maximum working load. To establish the proper design factor, several operating characteristics should be considered:

- speed of operation
- acceleration and deceleration
- length of rope
- number, size and location of sheaves and drums
- rope attachments
- conditions causing corrosion and abrasion
- danger to human life and property.

Generally Accepted Design Factors

Type of Service	Minimum Factor
Guy Ropes	3.5
Overhead and Gantry Cranes	3.5
Jib and Pillar Cranes	3.5
Derricks	3.5
Wire Rope Slings	5.0
Misc. Hoisting Equipment	5.0
Ski Lift Ropes – slopes under 3,000 feet	5.0
slopes over 3,000 feet	4.5
Haulage Ropes	5.0
Small Electric and Air Hoists	5.0
Rotation Resistant Ropes – Minimum	5.0
Recommended	7.0
Hot Ladle Cranes	8.0
Elevator Hoist and Counterweight Ropes (Passenger)	
500 FPM	10.25
750 FPM	11.15
1000 FPM	11.55

Fatigue Resistance

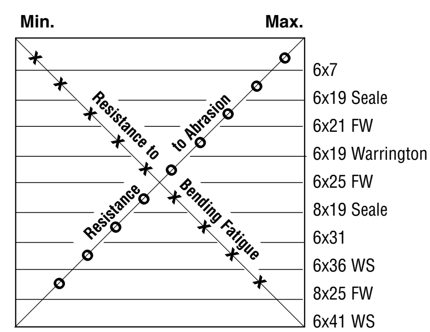
Smaller wires are the key to bending performance when wire ropes are subjected to repeated bending over sheaves or drums. The more outer wires for a given size wire rope, the better the resistance to bending fatigue. The relative bending life factors of typical wire rope constructions are indicated in the following table. Ropes having a large number of small wires, however, should not be used where overwrapping on a drum takes place because they do not provide sufficient crush resistance.

Relative bending life factors of typical ropes

Rope Construction	Factor
6x7	.57
19x7	.67
6x19 S	.80
6x21 FW	.92
Dyform-18 and 6 x 25 FW	1.00
6x31 WS	1.09
Dyform-6 and 6 x 36 WS	1.31
8x25 FW	1.39
6x41 WS	1.39
6x49 SWS	1.54

Abrasion Resistance

Lang lay and large outer wires provide resistance to abrasion. The relationship between abrasion resistance and fatigue resistance is illustrated.



Crush Resistance

An IWRC (Independent Wire Rope Core) and large outer wires will provide best crush resistance. Constructex rope provides the best crush resistance of any wire rope.

Flexibility

Fiber core, lang lay and smaller wires provide a more flexible wire rope.

Installation, Operation and Maintenance Recommendation

Common Causes of Failure

The primary factor in wire rope performance is selecting a wire rope with the best combination of properties for the job. The service life of that rope can be greatly extended by following a planned program of installation, operation, maintenance and inspection to avoid the most common causes of wire rope failure:

KINKING will result in permanent rope deformation and localized wear. It is generally caused by allowing a loop to form in a slack line and then pulling the loop down to a tight permanent set.

OVERLOADING results in accelerated wear, abrasion, rope crushing and distortion on drums and sheaves, and could result in complete rope failure.

DRAGGING wire rope over a bank or some other object results in localized wear, which means shorter life.

IMPROPER SPOOLING results in crushed and distorted ropes and comes from careless installation and operation of the rope.

WHIPPING a line, which results in many squared off broken wires, comes from jerking or running the line loose.

The following recommendations are general guides for getting the longest life from your wire rope. Our engineers and field service specialists are available to provide advice in specific situations.

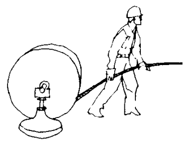
Wire Rope 101

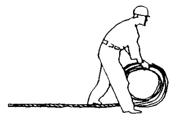
Installation, Operation and Maintenance Recommendation (cont.)

Unloading, Unreeling and Uncoiling

Suitable precautions should be taken to prevent dropping of reels or coils during unloading and moving. If the reel should collapse, it may be impossible to remove the rope without serious damage.

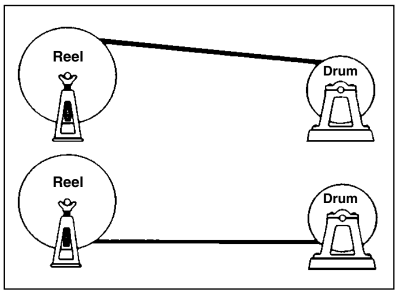
Special care should be taken in unreeling wire rope to avoid kinking, which can result in permanent damage to the rope. The reel should be mounted on jacks or a turntable so that it will move freely. It should be unreeled straight and under enough tension to keep it from starting a loop.





A coil should be unwound by rolling along the floor like a hoop. Coils should never be laid flat and the free end pulled out.

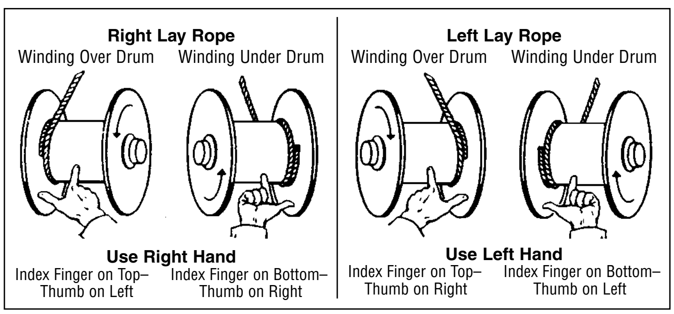
Winding on a Drum



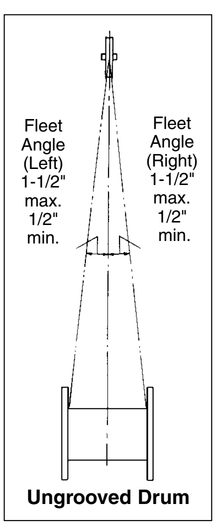
Proper practices for transferring rope from reel to drum:

- The reel should be placed as far from the drum as possible in order to avoid putting any turn into the rope.
- Rope should be wound from top-to-top or bottom-to-bottom to avoid reverse bends, which tend to make a rope harder to handle.
- Use enough tension to avoid kinking.

There is usually only one way to install rope on a **grooved** drum.



On **ungrooved** drums, the "rule of thumb" guides installation. The fist represents the drum; the index finger the wire rope; and the thumb the direction of the proper dead end location. Use the right hand for right lay ropes, the left hand for left lay ropes. For overwinding, the palm is down; for underwinding, the palm is up. Most drum anchors are set for right lay rope since it is the most common specification.



Ungrooved Drum

On installations where the rope passes over a sheave onto the drum, the maximum fleet angle (angle between the center line of the sheave and the rope) should be not more than 1-1/2 degrees for a smooth-faced drum and 2 degrees for a grooved drum. A 1-1/2 degree fleet angle is equivalent to 38 feet of lead for each foot of rope travel on either side of the center line of the sheave. Smaller fleet angles may result in the rope piling up on the drum. Larger fleet angles may cause excessive wear from rubbing against the flanges of the sheave as well as excessive crushing and abrasion of the rope on the drum.

Break In

A few trips through the working cycle at slow speed and light load will set the strands firmly in place for smooth, efficient operation.

On applications using a wedge socket, such as drag and hoist ropes, it is also a good idea to cut off a short section of rope to allow twist to run out and to equalize the strands.

Operation

Skillful operation is important to wire rope performance. Rapid acceleration, shock loading and excessive vibration can cause premature rope failure. Smooth, steady application of power by the equipment operator can add significantly to wire rope service life.

Shifting Wear Points

Some sections of most wire ropes get more wear than others. A regular inspection program will identify points of wear and lead to wear-shift practices that will extend wire rope life.

In many common situations, cutting off short lengths of the rope will redistribute the points of maximum wear:

- Rope on a drum with two or more layers will wear at the point where the rope starts each successive layer.
- Crane ropes will fatigue at an equalizer sheave. Careful inspection is required to identify fatigue points.
- Hoist ropes will frequently fail from vibration fatigue at sockets, clips and dead end points.

On most installations, wear and fatigue are more severe on one half of the rope than the other. Changing a rope end-for-end more evenly distributes wear and fatigue from repeated bending and vibration.

Lubrication

Factory lubrication is not always sufficient to last the useful life of wire rope. Periodic field lubrication may be required to minimize friction and provide corrosion protection. Important guides for field lubrication:

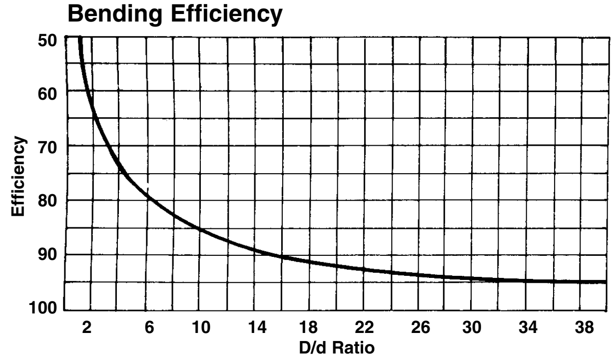
- Ropes should be inspected frequently to determine the need for lubrication.
- Clean the rope thoroughly with a wire brush, scraper or compressed air to remove foreign material and old lubricant from the valleys between the strands and the spaces between the outer wires.
- The lubricant should be applied at a point where the rope is being bent in order to promote penetration within the strands. It may be applied by pouring, dripping or brushing.
- Used motor oil is not recommended as a wire rope lubricant.

Bronze Lube® is recommended for relubing ropes originally supplied with Bronze Lube. In other situations, the lubricant should be light bodied enough to penetrate the rope. It should also contain a corrosion inhibitor.

Matching the Wire Rope with Sheaves and Drums

The ratio of the diameter of the wire rope to the diameter of operating sheaves and drums (D/d ratio) is particularly important to service life. A sheave or drum that is too small for the rope diameter will cause premature failure due to bending stresses.

Bending Efficiency



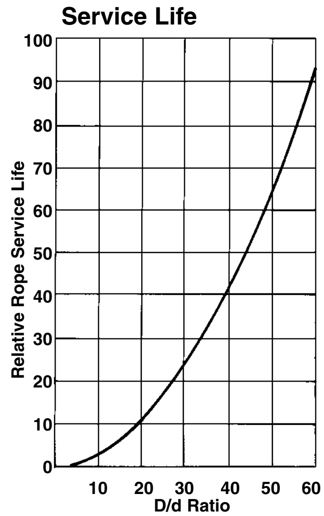
Efficiency falls as the D/d ratio becomes smaller. This curve, based on static test data only, illustrates the decline of bending efficiency for 6x19 and 6x37 classification ropes as the D/d ratio is reduced.

Wire Rope 101

Installation, Operation and Maintenance Recommendation (cont.)

Matching the Wire Rope with Sheaves and Drums (cont.)

Service life increases as the D/d ratio becomes larger. This curve, based on bending and tensile stresses only, illustrates the relative performance increase.



Sheave Dia. Factors		
	*D/d Ratios	
Rope Construction	Recommended	Min.
6 x 7	72	42
19 x 7	51	34
6 x 19 S	51	34
6 x 21 FW	45	30
6 x 25 FW	39	26
6 x 36 WS	35	23
8 x 25 FW	32	21
6 x 41 WS	32	21

*D-Sheave Tread Dia. d-Nominal Rope Dia.

To calculate the recommended or minimum sheave diameter for any given rope, find the rope construction and multiply the rope diameter by the value shown. (Ex.: Recommended sheave diameter for a 6 x 19 classification wire rope of 3/4" diameter would be 51 x.75 = 38-1/4")

Rope speed also affects fatigue life. Higher operating rates require larger sheaves.

Reverse bends from one sheave to another should be avoided. Other factors that affect bending fatigue life are load, number of cycles and condition of the sheaves and drums. Consult Hanes Supply for specific recommendations.

Matching Grooves to the Wire Rope

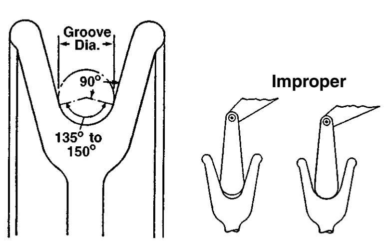
Grooves should be spaced so that one wrap of rope does not rub against the next wrap during operation.

Grooves in sheaves and drums should be slightly larger than the wire rope to permit the rope to adjust itself to the groove. Tight grooves will cause excessive wear to outer wires; large grooves do not support the rope properly.

Wire ropes are manufactured slightly larger than nominal size. Maximum allowable oversize tolerances are shown in the table.

Nominal Rope Dia. (in)	Tolerance	
	Under	Over
up to 1/8	–0	+ 8%
over 1/8 to 3/16	–0	+ 7 %
over 3/16 to 1/4	–0	+ 6%
over 1/4	–0	+ 5%

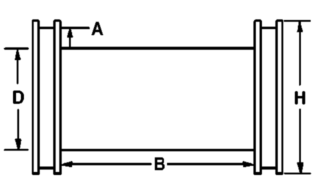
As a rope is run through a groove, both become smaller. A used groove can be too small for a new rope; thus accelerating rope wear. A compromise between rope life and machining frequency must be made.



Grooves should have an arc of contact with the wire rope between 135 and 150 degrees. They should be tapered to permit the rope to enter and leave the groove smoothly. Field inspection groove gauges are made to the nominal diameter of the rope plus 1/2 of the allowable rope oversize tolerance. When the field inspection gauge fits perfectly, the groove is at the minimum permissible contour.

Calculating Drum Capacity

The length of rope that can be wound on a drum or reel may be calculated as follows. L = the length of rope in feet. All other dimensions are in inches.



Values of K			
Rope Dia. (in)	K	Rope Dia. (in)	K
1/4	3.29	1-1/8	.191
5/16	2.21	1-1/4	.152
3/8	1.58	1-3/8	.127
7/16	1.19	1-1/2	.107
1/2	.925	1-5/8	.0886
9/16	.741	1-3/4	.0770
5/8	.607	1-7/8	.0675
3/4	.428	2	.0597
7/8	.308	2-1/8	.0532
1	.239	2-1/4	.0476

L = (A+D) x A x B x K
K = Constant obtained by dividing .2618 by the square of the actual rope diameter.
A = $\frac{H-D}{2}$ – Desired clearance (in)
B = Traverse in inches.
D = Barrel Diameter (in).
H = Flange Diameter (in).
L = Rope length (ft).

Conversion Tables

Weight

1 KG - 2.2046 LB	1 LB = 0.4536 KG
1 KG/M = 0.6720 LB/FT	1 LB/FT = 1.4881 KG/M
1 TONNE (t) = 0.9842 UK TON	1 UK TON = 1.01605 TONNES (t)
1 KG = 1000 G	1 KIP (US) = 1000 LB
1 METRIC TON = 2204.62 LB	1 US TON = .9072 METRIC TON = 907.2 KG

Rope Lengths...Rope & Wire Diameters

1 M = 3.28O8 FT	1 FT = 0.3048M
1 KM = 0.6124 MILE	1 MILE = 1.6093 KM
1 MM = 0.0394 IN	1 IN = 25.3999 MM
1 M = 39.3701 IN	1 IN = 0.0254 M

Wire Tensile Grades, Rope Modulus & Sheave Pressures

1 N/MM² = 0.102 KGF/MM²	
1 KG/MM² = 9.8066 N/MM²	
1 N/MM² = 1 MPA	
1 KGF/MM² = 1422.33 LBF/IN²	1 LBF/IN² = 7.030 X 10^{-4} KGF/MM²
1 KGF-M = 7.233 FT-LBF	1 FT-LBF = 0.1383 KGF-M
1 MPA = 145.038 LBF/IN²	1 LBF/IN² = 0.0069 MPA

Nominal Strengths & Breaking Strengths

1 KN = 0.102 MPA	
1 N = 0.2248 LBF	1 LBF = 4.4482 N
1 KN = 224.8 LBF	1 LBF = 0.00445 KN
1 N = 0.1020 KGF	1 (2000 LB) TON F = 8.8964 KN
1 KGF = 9.8066 N	1 (2240 LB) TON F = 9.9640 KN
1 KN = 101.972 KGF	
1 KGF = 2.2046 LBF	1 LBF = 0.4536 KGF

Zinc Coating Weights

1 G/M² = 0.00328 OZ/FT²	1 OZ/FT² = 304.88 G/M²

Metric Conversion Chart

Diameter		Diameter		Diameter		Diameter	
in.	mm	in.	mm	in.	mm	in.	mm
5/32	3.97	11/16	17.5	1-3/8	34.9	3	76.2
3/16	4.76	3/4	19.0	1-1/2	38.1	3-1/4	82.6
7/32	5.56	13/16	20.6	1-5/8	41.3	3-1/2	88.9
1/4	6.35	7/8	22.2	1-3/4	44.5	3-3/4	95.3
5/16	7.94	15/16	23.8	1-7/8	47.6	4	101.6
3/8	9.53	1	25.4	2	50.8	4-1/4	108.0
7/16	11.1	1-1/16	27.0	2-1/8	54.0	4-1/2	114.3
1/2	12.7	1-1/8	28.6	2-1/4	57.2	4-3/4	120.7
9/16	14.3	1-3/16	30.2	2-1/2	63.5	5	127.0
5/8	15.9	1-1/4	31.8	2-3/4	69.9		

Inspection of Wire Rope & Structural Strand

WIRE ROPE

Carefully conducted inspections are necessary to ascertain the condition of wire rope at various stages of its useful life. The object of wire rope inspection is to allow for removal of the rope from service before the rope's condition, as a result of usage, could pose a hazard to continued normal operations.

The individual making the inspection should be familiar with the product and the operation as his judgment is a most critical factor. Various safety codes, regulations, and publications give inspection requirements for specific applications.

The following inspection procedure, taken from the ASME B-30 series, serves as a model of typical inspection requirements.

Wire Rope 101

Inspection of Wire Rope & Structural Strand (cont.)

Frequent Inspection

All running ropes and slings in service should be visually inspected once each working day. A visual inspection consists of observation of all rope and end connections which can reasonably be expected to be in use during daily operations. These visual observations should be concerned with discovering gross damage such as listed below, which may be an immediate hazard:

- Distortion of the rope such as kinking, crushing, unstranding, birdcaging, main strand displacement or core protrusion.
- General corrosion.
- Broken or cut strands.
- Number, distribution and type of visible broken wires.
- Lubrication.

Special care should be taken when inspecting portions subjected to rapid deterioration such as flange points, crossover points and repetitive pickup points on drums.

Special care should also be taken when inspecting certain ropes such as:

- Rotation resistant ropes such as 19x7 and 8x19, because of their higher susceptibility to damage and increased deterioration when working on equipment with limited design parameters.
- Boom Hoist Ropes because of the difficulties of inspection and important nature of these ropes.

When damage is discovered, the rope should either be removed from service or given an inspection as detailed in the section below.

Periodic Inspection

The inspection frequency should be determined by a qualified person and should be based on such factors as: expected rope life as determined by experience on the particular installation or similar installations, severity of environment, percentage of capacity lifts, frequency rates of operation, and exposure to shock loads.

Periodic inspections with a signed report should be performed by an appointed or authorized person. This inspection should cover the entire length of rope. The individual wires in the strands of the rope should be visible to this person during the inspection. Any deterioration resulting in appreciable loss of original strength, such as described below, should be noted and a determination made as to whether further use of the rope would constitute a hazard:

- Distortion of the rope such as kinking, birdcaging, crushing, unstranding, main strand displacement, or core protrusion.
- Reduction of rope diameter below normal diameter due to loss of core support, internal or external corrosion, or wear of outside wires.
- Severely corroded or broken wires at end connections.
- Severely corroded, cracked, bent, worn, or improperly applied end connections.
- Lubrication.

Special care should be taken when inspecting portions subjected to rapid deterioration such as the following:

- Portions in contact with saddles, equalizer sheaves, or other sheaves where rope travel is limited.
- Portions of the rope at or near terminal ends where corroded or broken wires may protrude.

Rope Replacement

No precise rules can be given for determination of the exact time for replacement of rope, since many variable factors are involved. Continued use in this respect depends largely upon good judgment by an appointed or authorized person in evaluating remaining strength in a used rope, after allowance for deterioration disclosed by inspection. Continued rope operation depends upon this remaining strength.

Conditions such as the following should be sufficient reason for questioning continued use of the rope or increasing the frequency of inspection:

- In running ropes, six randomly distributed broken wires in one lay, or three broken wires in one strand in one lay. (The number of wire breaks beyond which concern should be shown varies with rope usage and construction. For general application 6 and 3 are satisfactory. Ropes used on overhead and gantry cranes (as defined in ASME B-30, 2-1983) can be inspected to 12 and 4. Rotation resistant ropes should be inspected to 4 and 2.)

Wire rope removal criteria are based on the use of steel sheaves. If synthetic sheaves are used, consult the sheave or equipment manufacturer.

- One outer wire broken at the contact point with the core of the rope which has worked its way out of the rope structure and protrudes or loops out from the rope structure.
- Wear of one-third the original diameter of outside individual wires.
- Kinking, crushing, birdcaging, or any other damage resulting in distortion of the rope structure.
- Evidence of any heat damage from any cause.
- Valley breaks.
- Reductions from nominal rope diameter of more than:

Reduction of (in)	Nominal Rope Dia. (in)
1/64	Up to & inc. 5/16
1/32	over 5/16" thru 1/2
3/64	over 1/2" thru 3/4
1/16	over 3/4" thru 1-1/8
3/32	over 1-1/8

- In standing ropes, more than two broken wires in one lay in section beyond end connections or more than one broken wire at an end connection.

Replacement rope shall have a strength rating at least as great as the original rope furnished by the equipment manufacturer or as originally specified. Any deviation from the original size, grade, or construction shall be specified by the equipment manufacturer, original design engineer, or a qualified person.

Ropes Not In Regular Use

All rope which has been idle for a period of a month or more due to shutdown or storage of equipment on which it is installed should be given inspections as previously described before being placed in service. This inspection should be for all types of deterioration and should be performed by an appointed or authorized person.

Inspection Records

Frequent Inspection–no records required.

Periodic Inspection: In order to establish data as a basis for judging the proper time for replacement a signed report of rope condition at each periodic inspection should be kept on file. This report should include points of deterioration previously described.

A long range inspection program should be established and include records of examination of ropes removed from service so a relationship can be established between visual observation and actual condition of the internal structure.

GALVANIZED STRUCTURAL WIRE STRAND

Carefully conducted inspections performed and recorded on a regular basis are necessary to ascertain the condition of structural strand at various stages of its useful life. The object of inspection is to allow for removal of the strand from service before its condition, as a result of usage, could pose a hazard to continued normal operations.

The individual making the inspection should be familiar with the operation, as his judgment is a most critical factor. Special care should be taken at end terminations or at dampener devices, as these are generally the most critical areas. Conditions such as corrosion, number, type and distribution of broken wires, and diameter reduction should be evaluated and compared with previous inspection results.

The actual condition of the strand and inspection history together can then be used to decide if continued use of the product is advisable.

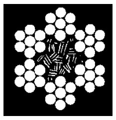
NOTE: Special methods and techniques may be used by wire rope engineers or qualified persons to determine the possible existence of internal corrosion or broken wires in structural strand or similar conditions which may exist out of sight in terminal connections.

EXAMPLE: Wire breaks may sometimes occur just inside the nose of the socket making visual inspection difficult. Judgments on wire integrity can be made by tapping or "sounding" the wire by a person experienced in this inspection technique. If you have doubt about the method to use for inspection, or the condition of the strand or fitting, contact Hanes Supply.

For assistance or more information on Wire Rope & Wire Rope Inspection give us a call - our qualified representatives can help!

General Purpose Wire Rope

6 x 7 Classification



6 x 7 Classification Wire Ropes give long service in operating conditions where ropes are dragged along the ground or over rollers. Larger sheaves and drums (than those used for more flexible constructions) are required to avoid breakage from fatigue. 6 x 7 Classification Ropes contain 6 strands with 3 through 14 wires, no more than 9 of which are outside wires.

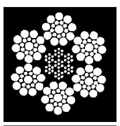
Characteristics: Excellent abrasion resistance; less bending fatigue resistance. *Typical Applications:* Dragging and and haulage in mines, inclined planes and tramways, sand lines. *IWRC shown: fiber core available*

Order Guide: 6 x 7 classification wire ropes may be ordered in diameters from 1/4" to 1-1/2"... bright or galvanized... EEIP, EIP and IPS grades... fiber core or IWRC... right or left lay, regular or lang lay.

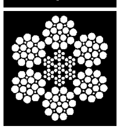
Dia. (in)	Nominal Strength(Tons)* – Bright or Drawn Galvanized†						Approx. Wt./Ft. (lbs)	
	EEIP		EIP		IPS			
	IWRC	Fiber Core	IWRC	Fiber Core	IWRC	Fiber Core	IWRC	Fiber Core
1/4	3.59	3.17	3.27	2.90	2.84	2.64	0.10	0.094
5/16	5.58	4.92	5.07	4.51	4.41	4.1	0.16	0.15
3/8	7.97	7.03	7.25	6.45	6.3	5.86	0.23	0.21
7/16	10.8	9.52	9.80	8.72	8.52	7.93	0.32	0.29
1/2	14.0	12.4	12.8	11.3	11.1	10.3	0.42	0.38
9/16	17.7	15.6	16.1	14.3	14.0	13.0	0.53	0.48
5/8	21.6	19.1	19.7	17.5	17.1	15.9	0.65	0.59
3/4	30.9	27.2	28.1	25.0	24.4	22.7	0.92	0.84
7/8	41.7	36.8	38.0	33.8	33.0	30.7	1.27	1.15
1	54.0	47.6	49.1	43.7	42.7	39.7	1.65	1.50
1-1/8	67.7	59.8	61.5	54.8	53.5	49.8	2.09	1.90
1-1/4	83.0	73.2	75.4	67.1	65.6	61.0	2.57	2.34
1-3/8	99.4	87.7	90.4	80.4	78.6	73.1	3.12	2.84
1-1/2	117.0	103.0	107.0	94.8	92.7	86.2	3.72	3.38

6 x 19 Classification

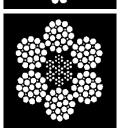
6 x 19 Classification ropes provide an excellent balance between fatigue and wear resistance. They give excellent service with sheaves and drums of moderate size. 6 x 19 Classification ropes contain 6 strands with 15 through 26 wires per strand, no more than 12 of which are outside wires.



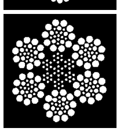
6 x 19 Seale *Characteristics:* Resistant to abrasion and crushing; medium fatigue resistance. *Typical Applications:* Haulage rope, choker rope, rotary drilling line. *IWRC shown: fiber core available*



6 x 21 Filler Wire *Characteristics:* Less abrasion resistance; more bending fatigue resistance. *Typical Applications:* Pull Ropes, load lines, backhaul ropes, draglines. *IWRC shown; fiber core available*



6 x 25 Filler Wire *Characteristics:* Most flexible rope in classification; best balance of abrasion and fatigue resistance. *Typical Applications:* Most widely used of all wire ropes - cranes hoists, skip hoists, haulage, mooring lines, conveyors, etc. *IWRC shown; fiber core available*



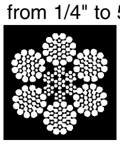
6 x 26 Warrington Seale *Characteristics:* Good balance of abrasion and fatigue resistance. *Typical Applications:* Boom hoists, logging and tubing lines. *IWRC shown, fiber core available*

Dia. (in)	Nominal Strength(Tons)* – Bright or Drawn Galvanized†						Approx. Wt./Ft. (lbs)	
	EEIP		EIP		IPS			
	IWRC	Fiber Core	IWRC	Fiber Core	IWRC	Fiber Core	IWRC	Fiber Core
1/4	–	–	3.40	3.02	2.94	2.74	0.116	0.105
5/16	–	–	5.27	4.69	4.58	4.26	0.18	0.164
3/8	–	–	7.55	6.71	6.56	6.10	0.26	0.236
7/16	11.2	9.90	10.2	9.09	8.89	8.27	0.35	0.32
1/2	14.6	12.9	13.3	11.8	11.5	10.7	0.46	0.42
9/16	18.5	16.2	16.8	14.9	14.5	13.5	0.59	0.53
5/8	22.7	20.0	20.6	18.3	17.9	16.7	0.72	0.66
3/4	32.4	28.6	29.4	26.2	25.6	23.8	1.04	0.95
7/8	43.8	38.6	39.8	35.4	34.6	32.2	1.42	1.29
1	57.5	50.0	51.7	46.0	44.9	41.8	1.85	1.68
1-1/8	71.5	63.0	65.0	57.9	56.5	52.6	2.34	2.13
1-1/4	87.9	77.5	79.9	71.0	69.4	64.6	2.89	2.63
1-3/8	106.0	93.0	96.0	85.4	83.5	77.7	3.50	3.18
1-1/2	125.0	111.0	114.0	101.0	98.9	92.0	4.16	3.78
1-5/8	145.0	129.0	132.0	118.0	115.0	107.0	4.88	4.44
1-3/4	168.0	149.0	153.0	136.0	133.0	124.0	5.67	5.15
1-7/8	191.0	169.0	174.0	155.0	152.0	141.0	6.50	5.91
2	218.0	192.0	198.0	176.0	172.0	160.0	7.39	6.72
2-1/8	–	–	221.0	197.0	192.0	179.0	8.35	7.59
2-1/4	–	–	247.0	220.0	215.0	200.0	9.36	8.51
2-3/8	–	–	274.0	244.0	239.0	222.0	10.4	9.48
2-1/2	–	–	302.0	269.0	262.0	244.0	11.6	10.5
2-5/8	–	–	331.0	–	288.0	268.0	12.8	11.6
2-3/4	–	–	361.0	–	314.0	292.0	14.0	12.7

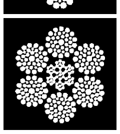
6 x 37 Classification

6 x 37 classification ropes contain 6 strands with 27 through 49 wires, no more than 18 of which are outside wires. More flexible but less abrasion resistant than the 6 x 19 classification. Each strand contains numerous small diameter wires. As the number of wires increases, flexibility increases.

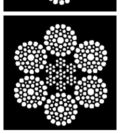
Order Guide: 6 x 37 classification wire ropes may be ordered in diameters from 1/4" to 5"... bright or galvanized... EEIP, EIP or IPS grades... IWRC or fiber core... right or left lay, regular lang lay.



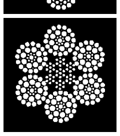
6 x 31 Warrington Seal *Characteristics:* 12 outside wires. Slightly more flexible than 6 x 25 rope with the same abrasion resistance. *Typical Applications:* Overhead crane and mobile crane hoist ropes. *IWRC shown; fiber core available*



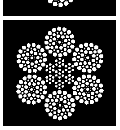
6 x 36 Warrington Seale *Characteristics:* 14 outside wires. More fatigue resistance; but less abrasion resistance than 6 x 25 rope. *Typical Applications:* Overhead crane and mobile crane hoist ropes; winch lines; large diameter towing lines. *IWRC shown; fiber core available*



6 x 41 Warrington Seale *Characteristics:* 16 outside wires. Good combination of fatigue and abrasion resistance for operating ropes. *Typical Applications:* Overhead crane and mobile crane hoist ropes; shovel and dragline hoist ropes. *IWRC shown; fiber core available*



6 x 41 Seale Filler Wire *Characteristics:* Same characteristics and applications as 6 x 41 Warrington Seale. *IWRC shown; fiber core available*



6 x 49 Seale Warrington Seale *Characteristics:* 16 outside wires. Best fatigue resistance and abrasion resistance in 6 x 37 classification *Typical Applications:* Mooring, towing and anchor lines. *IWRC shown; fiber core available*

Dia. (in)	Nominal Strength(Tons)* – Bright or Drawn Galvanized†						Approx. Wt./Ft. (lbs)	
	EEIP		EIP		IPS			
	IWRC	Fiber Core	IWRC	Fiber Core	IWRC	Fiber Core	IWRC	Fiber Core
1/4	–	–	3.40	3.02	2.94	2.74	0.116	0.105
5/16	–	–	5.27	4.69	4.58	4.26	0.180	0.164
3/8	–	–	7.55	6.71	6.56	6.10	0.260	0.236
7/16	–	–	10.2	9.09	8.89	8.27	0.35	0.32
1/2	14.6	12.9	13.3	11.8	11.5	10.7	0.46	0.42
9/16	18.5	16.2	16.8	14.9	14.5	13.5	0.59	0.53
5/8	22.7	20.0	20.6	18.3	17.9	16.7	0.72	0.66
3/4	32.4	28.6	29.4	26.2	25.6	23.8	1.04	0.95
7/8	43.8	38.6	39.8	35.4	34.6	32.2	1.42	1.29
1	57.5	50.0	51.7	46.0	44.9	41.8	1.85	1.68
1-1/8	71.5	63.0	65.0	57.9	56.5	52.6	2.34	2.13
1-1/4	87.9	77.5	79.9	71.0	69.4	64.6	2.89	2.63
1-3/8	106.0	93.0	96.0	85.4	83.5	77.7	3.50	3.18
1-1/2	125.0	111.0	114.0	101.0	98.9	92.0	4.16	3.78
1-5/8	145.0	129.0	132.0	118.0	115.0	107.0	4.88	4.44
1-3/4	168.0	149.0	153.0	136.0	133.0	124.0	5.67	5.15
1-7/8	191.0	169.0	174.0	155.0	152.0	141.0	6.50	5.91
2	218.0	192.0	198.0	176.0	172.0	160.0	7.39	6.72
2-1/8	243.0	215.0	221.0	197.0	192.0	179.0	8.35	7.59
2-1/4	272.0	240.0	247.0	220.0	215.0	200.0	9.36	8.51
2-3/8	301.0	266.0	274.0	244.0	239.0	222.0	10.4	9.48
2-1/2	332.0	293.0	302.0	269.0	262.0	244.0	11.6	10.5
2-5/8	–	–	331.0	–	288.0	268.0	12.8	11.6
2-3/4	–	–	361.0	–	314.0	292.0	14.0	12.7
2-7/8	–	–	392.0	–	341.0	317.0	15.3	13.9
3	–	–	425.0	–	370.0	344.0	16.6	15.1

* Acceptance strength is not less than 2-1/2% below the nominal strengths listed.
† Galvanizing: For class A galvanized wire rope (EIP and IPS grades only), deduct 10% from the nominal strength shown.

Wire Rope

Rotation Resistant Wire Rope

Rotation Resistant Ropes are available in a full range of sizes, grades and constructions:

- Standard constructions for single part and multi part lifting.
- Special wire rope constructions for increased service life in particularly demanding applications–DYFORM -18 HSLR, Dyform 34LR and 35LS.

Note:

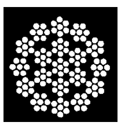
1. Swivels are not recommended for use with rotation resistant ropes.

2. Although B30 standards permit rotation resistant ropes to be used under certain conditions at design factors of 3.5:1, we recommend a minimum design factor of 5:1 and a design factor of 7:1 for extended rope life.

Order Guide: 19 x 7 is a bright, IWRC, right regular wire rope. It may be ordered in diameters from 3/16" to 1-5/8"... EIP or IPS grade.

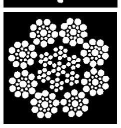
8 x 19 is a bright, IWRC, right regular lay wire rope. It may be ordered in diameters from 7/16" to 1-1/2"... EIP or IPS.

Dyform-18 HSLR is a bright, special grade, strand core, right regular lay wire rope. It may be ordered in diameters from 3/8" to 1-1/4".

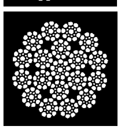


Dyform34LR and 35LS are specially constructed wire ropes. Call Hanes Supply for details.

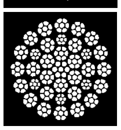
19 x 7 Rotation Resistant Rope *Characteristics:* Inner strands are left lang lay; outer strands are right regular lay; the natural rotation tendency of one layer is balanced by the other. Not recommended for multiple part lifting.



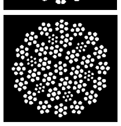
8 x 19 Rotation Resistant Rope *Characteristics:* Inner and outer strands are laid in opposing directions to counter rotation. More easily damaged in service than other ropes. Can be used for multiple part lifting.



Dyform® - 18 HSLR Rotation Resistant Ropes *Characteristics:* Compacted strands with outside and inside strands laid in opposite directions for superior rotation resistance. Can be, used for multiple part lifting. Dyform-18 HSLR, made with higher strength steel wires, offers 35% greater strength.



Dyform® - 34LR *Characteristics:* Strongest, most rotation resistant of all rotation resistant wire ropes; used for the most demanding hoisting applications.



35LS *Characteristics:* Same rotation resistance as Dyform-34LR; used for demanding applications where highest strength is not mandatory.

Dyform®-34LR & 35LS Rotation Resistance Rope

Diameter		Min. Breaking Force** (Tons)			Approx. Wt./Ft.(lbs)	
		1960		2160		
(mm)	(in)	34LR	35LS	34LR	34LR	35LS
–	1/2	15.40	13.60	17.42	0.54	0.49
13	–	16.19	14.28	18.21	0.57	0.51
14	–	18.88	16.52	21.13	0.65	0.60
–	9/16	19.67	17.31	22.03	0.69	0.62
15	–	22.03	19.11	24.73	0.77	0.69
16	5/8	25.18	21.69	28.21	0.87	0.78
17	–	27.20	24.28	30.46	0.94	0.87
18	–	30.80	27.09	34.62	1.07	0.97
19	3/4	34.51	30.91	38.67	1.20	1.11
20	–	38.33	33.61	42.94	1.32	1.21
21	–	43.28	37.43	48.45	1.49	1.34
22	–	46.65	41.37	52.38	1.61	1.49
–	7/8	47.21	41.59	53.06	1.65	1.51
23	–	50.69	44.74	56.88	1.75	1.61
24	–	55.64	49.35	62.38	1.92	1.77
25	–	60.59	52.94	67.89	2.10	1.91
–	1	62.38	54.40	70.03	2.16	1.97
26	–	66.09	57.78	74.19	2.28	2.08
28	–	75.99	66.99	85.20	2.63	2.41
–	1-1/8	77.45	68.90	86.89	2.70	2.50
30	–	86.44	75.99	97.01	2.99	2.74
32	1-1/4	98.13	85.99	110.16	3.39	3 10
35	1-3/8	116.90	105.89	123.65	4.05	3.82
38	1-1/2	138.26	120.27	147.25	4.87	4.35

Dyform®-18 HSLR Rotation Resistant Rope

Dia. (in)†	Nominal Strength* (Tons)	Approx. Wt./Ft. (lbs)
3/8	8.3	.27
7/16	11.2	.37
1/2	14.6	.51
9/16	18.5	.64
5/8	22.7	.79
3/4	32.4	1.1
7/8	43.8	1.5
1	57.5	2.0
1-1/8	71.5	2.5
1-1/4	87.9	3.1

19 x 7 Rotation Resistant Rope

Dia. (in)	Nominal Strength* (Tons) EIP	IPS	Approx. Wt./Ft. (lbS)
3/16	1.57	1.42	0.064
1/4	2.77	2.51	0.113
5/16	4.30	3.90	0.177
3/8	6.15	5.59	0.25
7/16	8.33	7.58	0.35
1/2	10.8	9.85	0.45
9/16	13.6	12.4	0.58
5/8	16.8	15.3	0.71
3/4	24.0	21.8	1.02
7/8	32.5	29.5	1.39
1	42.2	38.3	1.82
1-1/8	53.1	48.2	2.30
1-1/4	65.1	59.2	2.80
1-3/8	78.4	71.3	3.43
1-1/2	92.8	84.4	4.08
1-5/8	108.0	98.4	4.80
8 x 19 Rotation Resistant Rope			
7/16	8.97	7.80	0.36
1/2	11.7	10.2	0.47
9/16	14.7	12.8	0.60
5/8	18.1	15.7	0.73
3/4	25.9	22.6	1.06
7/8	35.0	30.5	1.44
1	45.5	39.6	1.88
1-1/8	57.3	49.8	2.39
1-1/4	70.5	61.3	2.94
1-3/8	84.9	73.8	3.56
1-1/2	100.0	87.3	4.24

* Acceptance strength is not less than 2-1/2% below the nominal breaking strengths listed.

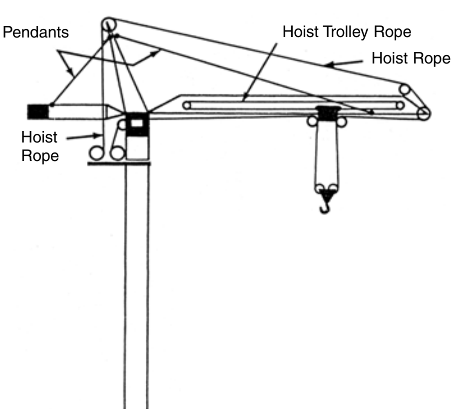
NOTE: These strengths apply only when a test is conducted with both ends fixed. When in use, the strength of these ropes may be reduced if one end is free to rotate.

** Listed minimum breaking force is for 1960 & 2160 grade bright (ungalvanized) ropes. Inquire for minimum breaking force of galvanized ropes.

† Other sizes available on request.

Tower Power - 35™ 35 x 7 Non-Rotating Bright

(Tower Crane Rope)



Greater Rotation Resistance: The unique design of Tower Power 35™ is such that it produces lower torque than 19x7 rotation resistant wire ropes. The torque of the core and strands is minimized so that the tendency to turn does not occur at normal load ranges of 0-20% of the rope's nominal strength.

Greater Lifting Power: The increased number of wires and strands, combined with Its greater stability and balance, creates more metallic area and thus greater strength.

Greater Fatigue Resistance: The same increase in number of wires and strands within a given diameter, also creates greater ability to withstand reverse bending.

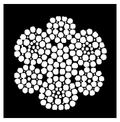
Greater Service Life: All of this allows the rope to have greater groove contact and reduced surface pressure. The result is increased service life.

Dia. (mm)	Approx. Wt./Ft. (lbs.)	Nominal Strength (lbs.)
10	.30	16,900
11	.36	20,200
12	.43	24,200
13	.49	27,800
14	.58	32,600
15	.66	37,400
16	.76	42,300
17	.85	47,800
18	.96	54,000
19	1.06	59,800
20	1.20	67,400
21	1.27	72,200
22	1.45	81,000
23	1.58	87,300
24	1.70	95,100
25	1.81	103,300
26	2.00	112,100
27	2.15	120,500
28	2.30	128,100
–	–	–
30	2.66	147,700
32	3.00	167,100

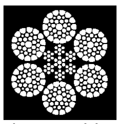
Wire Rope

High Performance Wire Rope

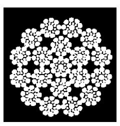
High Performance Wire rope are specially designed wire ropes for extended service and economical performance in particularly demanding situations.



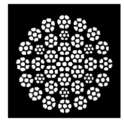
Constructex® *Characteristics:* Made of three different strand constructions (7-wire, 24-wire and 40-wire strands). The nine strands are closed in one operation and lightly swaged to postform the rope and give the strands a triangular shape. Compacting increases strength and resistance to crushing. The smooth outside surface enhances abrasion and scrubbing resistance. Constructex can provide 1-1/2 to 2 times the service life of other wire ropes in severely abusive applications. *Typical Applications:* Tubing lines. Logging lines. Winch lines. Boom hoists. Scrap yard, mobile and overhead traveling cranes. Ore unloaders and ore bridges. Hot bed conveyors and car haulage.



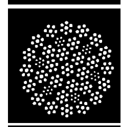
Dyform®-6 *Characteristics:* The Dyforming process produces high density wire rope made with compacted strands. Dyform-6 is a six strand construction with an Independent Wire Rope Core (IWRC). It meets or exceeds strength requirements of EEIPS rope. The compact strand construction provides better flexibility, bending life and crush resistance than standard 6-strand ropes. Compacting also produces a smooth surface for reduced bearing pressure; and increases the steel area by 100% for higher abrasion resistance and less sheave wear. *Typical Applications:* Boom hoist, load hoist and winch lines. Holding, closing, crowd and retract lines. Blast furnace skip hoist and bell operating ropes. Ore bridges and ore unloaders. Stripper, soaking pit, hot metal, scrap yard, mobile and overhead traveling cranes. Hot bed conveyors. Car haulage. Marine cargo falls.



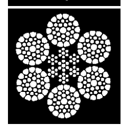
Dyform®-18 HSLR *Characteristics:* Dyform-18 HSLR is a multi-layer, compacted strand construction with outside strands laid opposite the inside strands. It offers better rotation resistance, better resistance to bending fatigue and up to 35% greater strength than conventional 19 x 7 EIPS wire rope. Dyform-18 may be used where strength limitations precluded rotation resistant wire rope in the past. The larger strand surface area gives excellent resistance to abrasion and reduced sheave and drum wear. Compacting also provides better resistance to crushing and allows multi-reeving of a rotation resistant rope. *Typical Applications:* Hoist lines on cranes with long lifts where block spinning occurs. Multi-part hoist line where drum crushing is a concern. Single part hoist lines where added strength is needed. Main and auxiliary hoist ropes where low rotation is required. Scrap yard, locomotive, truck and crawler cranes. Car haulage. Underground mine shaft sinking and counterweight ropes.



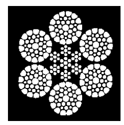
Dyform®-34LR *Characteristics:* Strongest, most rotation resistant of all rotation resistant wire ropes; used for the most demanding hoisting applications. *Typical Applications:* Tower crane hoist lines.



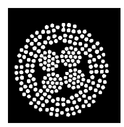
35LS *Characteristics:* Same rotation resistance as Dyform-34LR; used for demanding applications where highest strength is not mandatory. *Typical Applications:* Tower crane hoist lines.



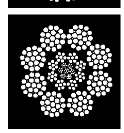
Dyex™ *Characteristics:* High density wire rope made with compacted strands. Meets or exceeds strength requirements of EIPS rope. Provides better bending life, crush resistance and abrasion resistance than EIPS rope. *Typical Applications:* Rotary drilling line. Riser-tensioner lines. Dragline hoist and drag ropes. Shovel hoist, crowd and retract ropes.



Dyplex® *Characteristics:* Combines the benefits of the Dyform manufacturing process with a plastic jacketed, cushioned steel core to create higher strength, reduced wire nicking and internal stresses, easier handling, greater bending fatigue life and extended service life. Dyplex can more than double conventional 6 x 37 classification rope life. It has also outperformed plastic filled ropes by 30%. *Typical Applications:* Shovel hoist rope.



Briflex™ *Characteristics:* Multi-flat-stranded construction around a coreless strand that produces flexibility on one axis and rigidity along the other. It offers an exceptional combination of flexibility and rotation resistance. *Typical Applications:* Balance ropes for friction hoists.



TIGER-8® Hoist and Drag Rope *Characteristics:* 8-strand wire ropes give longer life and reduced sheave wear because they have 33% greater bearing surface than 6-strand ropes of the same diameter. Different constructions are used to produce the optimum outside wire size for various operating situations. *Typical Applications:* Dragline hoist and drag rope, shovel hoist line. (See chart on opposite page)

Constructex® Rope

Dia. (in)†	Nominal Strength* (Tons)	Approx. Wt./Ft. (lbs.)
5/8	25.5	0.86
3/4	36.5	1.1
7/8	48.5	1.5
1	62.5	2.0
1-1/8	79.5	2.6
1-1/4	97.6	3.2
1-3/8	118.0	3.8
1-1/2	139.0	4.6
1-5/8	162.0	5.3

† Other sizes available on request

*Acceptance strength is not less than 2-1/2% below the nominal strengths listed.

Dyform-6

	Nominal Strength* (Tons)		Approx. Wt/Ft (lbs)	
Dia, (in)†	IWRC	Fiber Core	IWRC	Fiber Core
3/8	8.8	-	.31	-
7/16	11.9	-	.39	-
1/2	15.3	-	.49	-
916	19.3	-	.63	-
5/8	22.7	20.0	.78	.71
3/4	32.4	28.6	1.13	1.03
7/8	43.8	38.6	1.54	1.40
1	57.5	50.0	2.00	1.82
1-1/8	71.5	63.0	2.54	2.31
1-1/4	87.9	77.5	3.14	2.85
1-3/8	106.0	93.0	3.80	3.45
1-1/2	125.0	111.0	4.50	4.10

Dyform®-18HSLR Rotation Resistant Rope

Dia. (in)†	Nominal Strength* (Tons)	Approx. Wt./Ft. (lbs.)
3/8	8.3	.27
7/16	11.2	.37
1/2	14.6	.51
9/16	18.5	.64
5/8	22.7	.79
3/4	32.4	1.1
7/8	43.8	1.5
1	57.5	2.0
1-1/8	71.5	2.5
1-1/4	87.9	3.1

Dyex™ Hoist & Drag Rope

Dia. (in)†	Nominal Strength* (Tons)	Approx. Wt./Ft. (lbs)
7/8	39.8	1.54
1	51.7	2.00
1-1/8	65.0	2.54
1-1/4	79.9	3.14
1-3/8	96.0	3.80
1-1/2	114.0	4.50
1-5/8	132.0	5.27
1-3/4	153.0	6.12
1-7/8	174.0	7.02
2	198.0	7.98
2-1/8	221.0	9.02
2-1/4	247.0	10.10
2-3/8	274.0	11.20
2-1/2	302.0	12.50
2-5/8	331.0	13.80
2-3/4	361.0	15.10

Dyplex® Rope

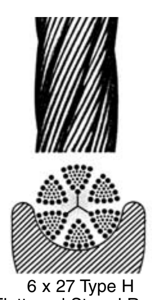
Dia. (in)†	Nominal Strength* (Tons)	Approx. Wt./Ft. (lbs)
1-1/4	79.9	3.14
1-3/8	96.0	3.80
1-1/2	114.0	4.50
1-5/8	132.0	5.27
1-3/4	153.0	6.12
1-7/8	174.0	7.02
2	198.0	7.98
2-1/8	221.0	9.02
2-1/4	247.0	10.1
2-3/8	274.0	11.2
2-1/2	302.0	12.5
2-5/8	331.0	13.8
2-3/4	361.0	15.1

Flattened Strand Rope

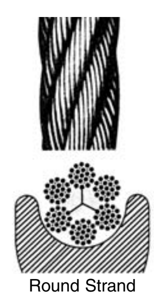
This rope is particularly suitable where severe conditions of crushing and abrasion are encountered on the drum or where a higher strength design factor is required than can be obtained with a similar round strand rope.

The triangular strand shape not only provides better resistance to crushing, but also offers a greater exposed surface area for contact with sheaves, drums, or underlying layers of spooled rope. This feature, in connection with the use of lang lay construction, distributes the abrasive wear over a greater number and length of wires.

The smooth surface of the rope also helps to minimize wear on drums and sheaves.



6 x 27 Type H Flattened Strand Rope with Fiber Core



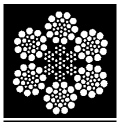
Round Strand Rope

Dia. (in)	Fiber Core Approx. Wt./Ft. (lbs)	Fiber Core Nominal Strength (Tons) IPS	Fiber Core Nominal Strength (Tons) EIPS	IWRC Approx. Wt./Ft. (lbs)	IWRC Nominal Strength (Tons) IPS	IWRC Nominal Strength (Tons) EIPS
5/8	.70	–	20.2	.74	–	21.7
3/4	1.01	–	28.8	1.06	–	31.0
7/8	1.39	–	39.0	1.45	–	41.9
1	1.80	–	50.6	1.89	–	54.4
1-1/8	2.28	57.9	63.7	2.39	62.2	68.5
1-1/4	2.81	71.0	78.1	2.95	76.3	84.0
1-3/8	3.40	85.5	94.1	3.57	91.9	101
1-1/2	4.05	101	111	4.25	108	119
1-5/8	4.75	118	130	4.99	127	140
1-3/4	5.51	136	150	5.79	146	161
1-7/8	6.33	155	171	6.65	167	184
2	7.20	176	194	7.56	189	207
2-1/8	8.13	197	217	8.54	212	233
2-1/4	9.10	220	242	9.56	236	260

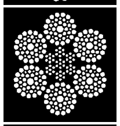
Wire Rope

Wire Rope for Surface Mining & Excavation

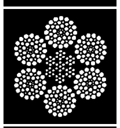
6 & 8 Strand Hoist and Drag Ropes



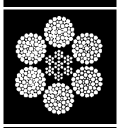
6 x 26 Warrington Seale *Characteristics:* 10 outside wires. Good balance of abrasion and fatigue resistance.



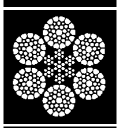
6 x 41 Warrington Seale TIGER® Hoist Rope *Characteristics:* 16 outside wires. More flexible construction for shovel and dragline hoist ropes.



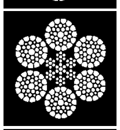
6 x 49 Seale Warrington Seale TIGER® Hoist and Drag Rope *Characteristics:* 16 outside wires. Used for large diameter shovel hoist, dragline hoist and drag ropes.



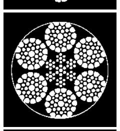
6 x 55 and 6 x 61* Seale Warrington Seale TIGER® Hoist and Drag Rope *Characteristics:* 18 outside wires. Used for mining ropes over 4" diameter. *(*construction not shown)*



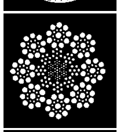
Dyex™ Hoist and Drag Rope *Characteristics:* High density wire rope made with compacted strands. Meets or exceeds strength requirements of EIPS rope. Provides better bending life, crush resistance and abrasion resistance than standard 6-strand rope.



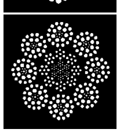
Dyplex® Excavator Rope *Characteristics:* Combines the benefits of the Dyform manufacturing process with plastic jacketed, cushioned steel core-higher strength, improved internal wear resistance, easier handling, greater bending fatigue life and extended service life.



Tiger Blue Excavator Rope *Characteristics:* All standard Tiger Drag, Tiger Hoist & Dyex ropes can be manufactured as Tiger Blue. Tiger Blue is a combination steel/high impact thermoplastic pressure filled wire rope specially designed for applications requiring high performance.



8 x 19 Tiger® - 8 Hoist and Drpag Rope *Characteristics:* 8-strand wire ropes give longer life and reduced sheave wear because they have 33% greater bearing surface than 6-strand ropes of the same diameter. Different constructions are used to produce the optimum outside wire size for various applications.



8 x 37 Tiger® - 8 Hoist and Drag Rope *Characteristics:* 8-strand wire ropes give longer life and reduced sheave wear because they have 33% greater bearing surface than 6-strand ropes of the same diameter. Different constructions are used to produce the optimum outside wire size for various applications.

Dyplex™ Rope

Dia. (in)†	Nominal Strength (Tons)	Approx. Wt./Ft. (lbs)
1-1/4	79.9	3.14
1-3/8	96.0	3.80
1-1/2	114.0	4.50
1-5/8	132.0	5.27
1-3/4	153.0	6.12
1-7/8	174.0	7.02
2	198.0	7.98
2-1/8	221.0	9.02
2-1/4	247.0	10.1
2-3/8	274.0	11.2
2-1/2	302.0	12.5
2-5/8	331.0	13.8
2-3/4	361.0	15.1

Dyex™ Hoist and Drag Rope

Dia. (in)†	Nominal Strength (Tons)	Approx. Wt./Ft. (lbs)
7/8	39.8	1.54
1	51.7	2.00
1-1/8	65.0	2.54
1-1/4	79.9	3.14
1-3/8	96.0	3.80
1-1/2	114. 0	4.50
1-5/8	132.0	5.27
1-3/4	153.0	6.12
1-7/8	174.0	7.02
2	198.0	7.98
2-1/8	221.0	9.02
2-1/4	247.0	10.10
2-3/8	274.0	11.20
2-1/2	302.0	12.50
2-5/8	331.0	13.80
2-3/4	361.0	15.10

Tiger® -8 Hoist & Drag Ropes

Dia. (in)†	Construction	Approx. Wt./Ft. (lbs)
1-3/4	8 x 19	5.77
1-7/8	8 x 19	6.60
2	8 x 19	7.50
2-1/8	8 x 19	8.48
2-1/4	8 x 19	9.50
2-3/8	8 x 37	10.6
2-1/2	8 x 37	11.8
2-5/8	8 x 37	13.0
2-3/4	8 x 37	14.2
2-7/8	8 x 37	15.5
3	8 x 37	16.8
3-1/8	8 x 37	18.3
3-1/4	8 x 37	19.8
3-3/8	8 x 37	21.3
3-1/2	8 x 37	23.0
3-5/8	8 x 37	24.7
3-3/4	8 x 37	26.4
3-7/8	8 x 37	28.1
4	8 x 37	30.0
4-1/8	8 x 37	31.9
4-1/4	8 x 37	33.9
4-3/8	8 x 37	35.9

Nominal strength available on request.

† Other sizes available upon request

* Acceptance strength is not less than 2-1/2% below the nominal strengths listed

TIGER Hoist & Drag Rope 6x25, 6x41, 6x49, 6x55 & 6x61

Dia. (in)	Tiger Hoist Rope	Tiger Drag Rope	Approx. Wt./Ft. (lbs)
3/4	6 x 25	6 x 25	1.04
7/8	6 x 25	6 x 25	1.42
1	6 x 25	6 x 25	1.85
1-1/8	6 x 26	6 x 26	2.34
1-1/4	6 x 41 6 x 49	6 x 26	2.89
1-3/8	6 x 41 6 x 49	6 x 26	3.50
1-1/2	6 x 41 6 x 49	6 x 26	4.16
1-5/8	6 x 41 6 x 49	6 x 26	4.88
1-3/4	6 x 41 6 x 49	6 x 26	5.67
1-7/8	6 x 41 6 x 49	6 x 26	6.50
2	6 x 41 6 x 49	6 x 25	7.39
2-1/8	6 x 41 6 x 49	6 x 25	8.35
2-1/4	6 x 41 6 x 49	6 x 25	9.36
2-3/8	6 x 41 6 x 49	6 x 25	10.4
2-1/2	6 x 41 6 x 49	6 x 25	11.6
2-5/8	6 x 49	6 x 25	12.8
2-3/4	6 x 49	6 x 25	14.0
2-7/8	6 x 49	6 x 49	15.3
3	6 x 49	6 x 49	16.6
3-1/8	6 x 49	6 x 49	18.0
3-1/4	6 x 49	6 x 49	19.5
3-3/8	6 x 49	6 x 49	21.0
3-1/2	6 x 49	6 x 49	22.7
3-5/8	6 x 49	6 x 49	24.3
3-3/4	6 x 49	6 x 49	26.0
3-7/8	6 x 49	6 x 49	27.7
4	6 x 49	6 x 49	29.6
4-1/8	6 x 55	6 x 55	31.4
4-1/4	6 x 55	6 x 55	33.4
4-3/8	6 x 55	6 x 55	35.4
4-1/2	6 x 61	6 x 55	37.4
4-5/8	6 x 61	6 x 55	39.5
4-3/4	6 x 61	6 x 55	41.7
4-7/8	6 x 61	6 x 55	43.9
5	6 x 61	6 x 55	46.2

Nominal strength available on request.

Herringbone Wire Rope

Strands: 6
Wires per strand: 31
Core: IWRC
Standard Grade(s): Purple Plus
Lay: Combination
Finish: Bright

Herringbone is a 6-strand wire rope comprised of four Lang and two regular lay strands. The Lang lay strands are arranged in pairs, with each pair of Lang lay alternating with one strand of regular lay.

Herringbone wire rope has a Lang lay's extra flexibility and abrasion resistance in combination with the structural stability of regular lay. It unites the best features of two types of wire rope.

Herringbone wire rope is made with relatively large outside wires to provide increased abrasion resistance to scrubbing against sheaves and drums. Finer inside wires add flexibility and enable Herringbone to absorb severe bending stresses. For these reasons it is well suited to winding applications where both crushing and abrasion occur.

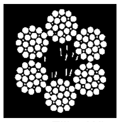
Herringbone wire rope is suited for boom hoist applications and numerous types of excavating equipment (clamshell rigs, shovels, cranes, winches and scrapers).

Rope Dia. (in)	Approx. Weight (lb/ft)	Nominal Strength*, tons Purple Plus
1/2	0.46	13.3
9/16	0.59	16.8
5/8	0.72	20.6
3/4	1.04	29.4
7/8	1.42	39.8
1	1.85	51.7
1-1/8	2.34	65.0
1-1/4	2.89	79.9

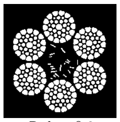
*Acceptance strength is not less than 2-1/2% below the nominal strengths listed. Tons of 2,000 lbs.

Wire Rope

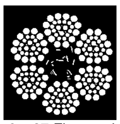
Wire Rope for Underground Mining & Tramway Operation


6 x 25 Filler Wire

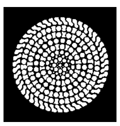
Round Strand Hoist Rope Used extensively for single layer winding applications.


Dyform®-6

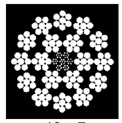
Dyform®- 6 Hoist Rope Used where greater strength and wear characteristics are required. For inclined slopes, ropes with larger outer wires are used.

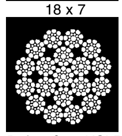

6 x 27 Flattened Strand

Flattened Strand Hoist Rope Triangular strand construction resists wear and crushing in multi-layer drum hoists. Greater surface area and high strength make it suitable for friction hoist ropes to depths of 2,500 feet.

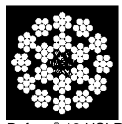

Full Locked Coil

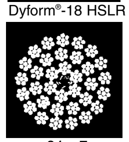
Full Locked Coil Hoist Rope Best rotation resistant properties with greater strength, size-for-size, than stranded ropes. Best construction for friction hoist applications for all feasible depths. Also used for sinking and stage ropes.

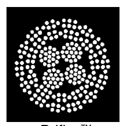

18 x 7


Dyform®-18 HSLR

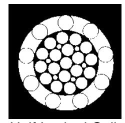
Sinking and Counter Weight Ropes Because of their strength and resistance to bending, abrasion and crushing, 18x7 IWRC, Dyform-18 and higher strength Dyform-18 HSLR Rotation Resistant constructions may also be used for shaft sinking applications; as well as for counterweight ropes that are not on fixed guides.


Dyform®-18 HSLR

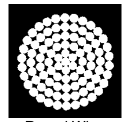

34 x 7


Briflex™

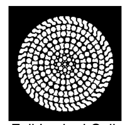
Balance Ropes Several wire rope constructions can be custom suited for friction hoist installations. Selection of the best construction for each application is based on present or proposed hoist ropes and conveyance centers to provide the best possible loop formation.


Half Locked Coil

Half Locked Coil Guide and Rubbing Rope Half locked coil construction offers the best locking and wear characteristics for guide and rubbing ropes. 1-3/4" diameter is commonly used in North America. Other diameters are available upon request.


Round Wire Track Strand

Round Wire Track Strand Made of concentric layers of round wires. Used on tramways and cableways; particularly on temporary installations to minimize cost. Does not provide the smoothness of full locked coil track strand.


Full Locked Coil

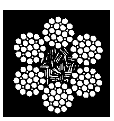
Full Locked Coil Aerial Track Strand Smooth surface, interlocking construction and greater cross-sectional area make this construction the best choice for aerial track strand.

Wire Ropes for underground mine hoisting systems and aerial tramway operations are normally custom designed for each individual installation. We offer specialized design service on single or double drum hoists as well as multi-rope friction hoisting systems - Call for complete details!

Elevator Wire Ropes

Iron Elevator Ropes

Made of low carbon wire; used as compensation, counterweight & governor ropes; also as hoist ropes on older installations.


6x25 Filler Wire

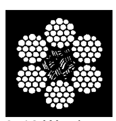

8x25 Filler Wire


8x19 Warrington

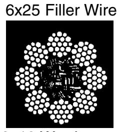
	6x25 Filler Wire Fiber Core		8x25 Filler Wire 8x19Warrington Fiber Core	
Dia. (in)	Nominal Strength (lbs)	Wt. lbs/ft	Strength (lbs)	Approx. Wt/Ft (lbs)
3/8	5000	.23	4200	.20
7/16	6400	.31	5600	.28
1/2	8400	.40	7200	.36
9/16	10600	.51	9200	.46
5/8	12800	.63	11200	.57
11/16	15500	.76	13400	.69
3/4	18200	.90	16000	.82
13/16	21500	1.06	18600	.96
7/8	24800	1.23	21400	1.11
15/16	28500	1.41	24600	1.27
1	32000	1.60	28000	1.45
1-1/16	36300	1.81	31400	1.64

Traction Steel Elevator Ropes

Wire rope for hoist, governor & compensation applications where flexibility & better traction are required.


6x19 Warrington


6x25 Filler Wire

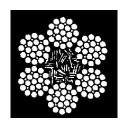

8x19 Warrington

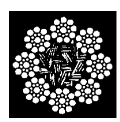

8x25 Filler Wire

	6x19 Warrington 6x25 Filler Wire Fiber Core		8x19 Warrington 8x19 Seale 8x21 Filler Wire 8x25 Filler Wire Fiber Core	
Dia. (in)	Nominal Strength (lbs)	Wt. lbs/ft	Strength (lbs)	Approx. Wt/Ft (lbs)
3/8	8200	.23	8200	.20
7/16	11000	.31	11000	.28
1/2	14500	.40	14500	.36
9/16	18500	.51	18500	.46
5/8	23000	.63	23000	.57
11/16	27000	.76	27000	.69
3/4	32000	.90	32000	.82
13/16	37000	1.06	37000	.96
7/8	42000	1.23	42000	1.11
15/16	48000	1.41	48000	1.27
1	54000	1.60	54000	1.45
1-1/16	61000	1.81	61000	1.64

Extra High Strength Traction Steel Elevator Ropes

Recommended for high-rise service for added strength & wear resistance w/i the physical confines of a standard elevator rope design. May be used for both V-groove & U-Groove service.

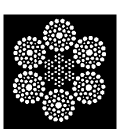

6x25 Filler Wire


8x19 Seale

†Formerly called High Rise Traction Ropes.

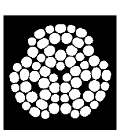
	6x19 Filler Wire Fiber Core		8x19 Seale Fiber Core	
Dia. (in)	Nominal Strength (lbs)	Wt. lbs/ft	Strength (lbs)	Approx. Wt/Ft (lbs)
3/8	11600	.23	9900	.20
7/16	15700	.31	13500	.28
1/2	20400	.40	17500	.36
9/16	25700	.51	22100	.46
5/8	31600	.63	27200	.57
11/16†	38200	.76	32800	.69
3/4	45200	.90	38900	.82
13/16	52900	1.06	46000	.96
7/8	61200	1.23	52600	1.11
15/16†	70000	1.41	60000	1.27
1	79500	1.60	68400	1.45
1-1/16	89400	1.81	77000	1.64

Wire Rope for Marine & Electrical Construction Applications



6 x 37 Classification Hawser and Mooring Line *Characteristics:* Available in IWRC for strength and crush resistance; fiber core for flexibility; galvanized for corrosion resistance. *IWRC shown, fiber core available*

Hawser and Anchor Line *Characteristics:* Same as above, bright finish.



3-Strand Swaged Wire Ropes *Characteristics:* Used in transmission line pulling because smooth surface does not chew-up neoprene lined sheaves. Less torque than 6 strand ropes-resists kinking; better spooling. Good strength to diameter ratio. *3 x 21 Swaged Pulling Line*

Order Guide: 6 x 37 Classification may be ordered in diameters from 1" through 3-1/2"... Bright or Galvanized... EIP or IPS grade... IWRC or fiber core (IPS grade only)... right or left lay, regular lay only.

3-Strand Swaged Wire Ropes are available in EIP grade and right lay only. They may be ordered in diameters from 3/8" to 1"... in three constructions... bright or galvanized.

3-Strand Swaged Wire Ropes

Dia. (in)	Class-ification	Max. Length (ft)	Nominal Strength* (tons)	Approx. Wt/Ft (lbs)
3/8	3 x 18	23,000	8.50	.300
7/16	3 x 18	17,500	11.80	.400
1/2	3 x 18	13,500†	15.50	.520
9/16	3 x 18	10,500†	18.50	.660
5/8	3 x 21	8,500†	22.50	.800
3/4	3 x 21	13,500	33.10	1.160
7/8	3 x 21	9,500	44.00	1.640
1	3 x 35	8,200	57.00	1.970

*Acceptance strength is not less than 2-1/2% below the nominal strengths listed.

** For nominal strengths of bright ropes see 6 x 37 classification.

† Longer lengths available at special prices.

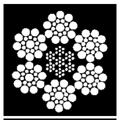
6 x 37 Galvanized Hawser, Mooing & Anchor Lines**

Dia. (in)	Nominal Strength* (Tons) EIP IWRC	IPS IWRC	IPS Fiber Core	Approx. Wt./Ft. (lbs) IWRC	Fiber Core
1	46.5	40.4	37.6	1 t85	1.68
1-1/8	62.9	50.9	47.3	2.34	2.13
1-1/4	77.5	62.5	58.1	2.89	2.63
1-3/8	92.4	75.2	69.9	3.50	3.18
1-1/2	108.0	89.0	82.8	4.16	3.78
1-5/8	129.0	104.0	96.3	4.88	4.44
1-3/4	145.0	120.0	112.0	5.67	5.15
1-7/8	168.0	137.0	127.0	6.50	5.91
2	190.0	155.0	144.0	7.39	6.72
2-1/8	213.0	173.0	161.0	8.35	7.59
2-1/4	238.0	193.0	180.0	9.36	8.51
2-3/8	267.0	215.0	200.0	10.4	9.48
2-1/2	292.0	236.0	220.0	11.6	10.5
2-5/8	320.0	259.0	241.0	12.8	11.6
2-3/4	348.0	283.0	263.0	14.0	12.7
2-7/8	377.0	307.0	285.0	15.3	13.9
3	406.0	333.0	310.0	16.6	15.1
3-1/8	439.0	359.0	334.0	18.0	16.4
3-1/4	473.0	386.0	359.0	19.5	17.7
3-3/8	509.0	413.0	384.0	21.0	19.1
3-1/2	545.0	442.0	411.0	22.7	20.6

Wire Rope

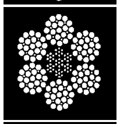
Wire Ropes for Logging

Logging Ropes are available in a full range of sizes, grades and constructions for logging applications in any type of terrain:

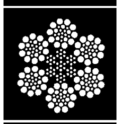


Archline, boom loader, choker, haulback, inhaul, mainline, sawmill carriage, skidding, skyline, slackline, strawline, triple drum line and winch lines.

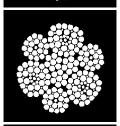
6 x 19 Seale *Characteristics:* Resistant to abrasion and crushing; medium fatigue resistance. *Typical Applications:* Mainline, haulback and straw lines



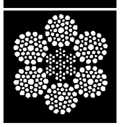
6 x 25 Filler Wire *Characteristics:* Good balance of flexibility, abrasion and fatigue resistance. *Typical Applications:* Sawmill carriage, loading and skylines



6 x 26 Warrington Seale *Characteristics:* High resistance to abrasion; good fatigue resistance. *Typical Applications:* Most widely used rope construction for logging applications, mainlines, winch lines, chokers, archlines and haulbacks



Constructex® Logging Rope *Characteristics:* A special 9-strand compacted design with a smooth surface for high strength, improved wear and crush resistance and better spooling. *Typical Applications:* Heavy duty applications requiring maximum resistance to scrubbing, crushing and abrasion.



6 x 36 Warrington Seale *Characteristics:* More fatigue resistance but less abrasion resistance than 6 x 25 rope. *Typical Applications:* Applications subject to fatigue and abrasions

Constructex® Rope

Dia. (in)†	Nominal Strength* (Tons) IPS	Approx. Wt/Ft (lbs)
5/8	25.5	0.86
3/4	36.5	1.1
7/8	48.5	1.5
1	62.5	2.0
1-1/8	79.5	2.6
1-1/4	97.6	3.2
1-3/8	118.0	3.8
1-1/2	139.0	4.6
1-5/8	162.0	5.3

*Acceptance strength is not less than 2-1/2% below the nominal strengths listed.
† Longer lengths available at special prices.

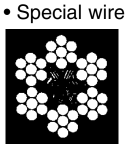
6x19 Classification (6x19, 6x25 & 6x26) & 6x37 Classification (6x36) Logging Lines

Dia. (in)†	Nominal Strength* (Tons) EIP IWRC	IPS IWRC	Approx. Wt/Ft (lbs)
1/4	3.40	2.94	0.116
5/16	5.27	4.58	0.18
3/8	7.55	6.56	0.26
7/16	10.2	8.89	0.35
1/2	13.3	11.5	0.46
9/16	16.8	14.5	0.59
5/8	20.6	17.9	0.72
3/4	29.4	25.6	1.04
7/8	39.8	34.6	1.42
1	51.7	44.9	1.85
1-1/8	65.0	56.5	2.34
1-1/4	79.9	69.4	2.89
1-3/8	96.0	83.5	3.50
1-1/2	114.0	98.9	4.16
1-5/8	132.0	115.0	4.88
1-3/4	153.0	133.0	5.67
1-7/8	174.0	152.0	6.50
2	198.0	172.0	7.39
2-1/8	221.0	192.0	8.35
2-1/4	247.0	215.0	9.36
2-3/8	274.0	239.0	10.4
2-1/2	302.0	262.0	11.6
2-5/8	331.0	288.0	12.8
2-3/4	361.0	314.0	14.0

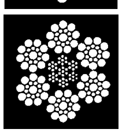
Wire Rope for Oil/Gas Drilling & Well Servicing

Wire Ropes are available in a full range of sizes, grades and constructions:

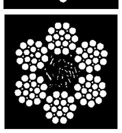
- Standard constructions for on shore and offshore drilling.
- Special wire rope constructions for increased service life in particularly demanding applications–Dyex Compacted Wire Ropes and CONSTRUCTEX® for Rotary Drilling or Tubing Lines.



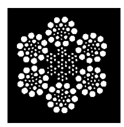
6 x 7 Sand and Swabbing Lines *Characteristics:* High abrasion resistance' spools evenly; resists kinking. Galvanized coating recommended for hydrogen sulfide, sour crude and salt water environments.



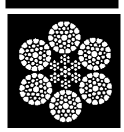
6 x 19 Seale Rotary Drilling Line *Characteristics:* Excellent balance between fatigue and wear resistance. Long service life with sheaves and drums of moderate size.
IWRC shown; fiber core available



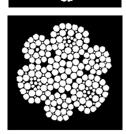
6 x 21 Cable Tool Drilling Line *Characteristics:* Excellent resistance to bending fatigue.



6 x 26 Tubing Line *Characteristics:* Good balance of abrasion and fatigue resistance.



Dyex™ Rotary Drilling Line *Characteristics:* High density wire rope made with compacted strands. Meets or exceeds strength requirements of EIPS rope. Provides better bending life, crush resistance and abrasion resistance than EIPS rope.



Constructex® *Characteristics:* Swaged to increase wearing surface and density. Can provide 1-1/2 to 2 times service life of other tubing lines due to its resistance to scrubbing and crushing and increased strength. Greater flexibility provides easier handling.

6 x 7 Sand Line, Swabbing Line

Dia. (in)	Nominal Strength* (Tons) IPS	Approx. Wt/Ft (lbs)
3/8	5.86	0.21
1/2	10.3	0.38
9/16	13.0	0.48
5/8	15.9	0.59
3/4	22.7	0.84

*Acceptance strength is not less than 2-1/2% below the nominal strengths listed.
† Longer lengths available at special prices.

Dyex™ Rotary Drilling Line

Dia. (in)	Nominal Strength* (Tons) IPS	Approx. Wt/Ft (lbs)
7/8	39.8	1.54
1	51.7	2.00
1-1/8	65.0	2.54
1-1/4	79.9	3.14
1-3/8	96.0	3.80
1-1/2	114.0	4.50
1-5/8	132.0	5.27
1-3/4	153.0	6.12
1-7/8	174.0	7.02
2	198.0	7.98

Constructex® Rope

Dia. (in)†	Nominal Strength* (Tons) IPS	Approx. Wt/Ft (lbs)
5/8	25.5	0.86
3/4	36.5	1.1
7/8	48.5	1.5
1	62.5	2.0
1-1/8	79.5	2.6
1-1/4	97.6	3.2
1-3/8	118.0	3.8
1-1/2	139.0	4.6
1-5/8	162.0	5.3

6 x 19 Classification Rope (6 x 19 Rotary Drilling Line, 6 x 21 Cable Tool Drilling Line & 6 x 26 Tubing Line)

Dia. (in)	Nominal Strength* (tons) EIP IWRC	Fiber Core	IPS IWRC	Fiber Core	Approx. Wt/Ft (lbs) IWRC	Fiber Core
5/8	20.6	18.3	17.9	16.7	0.72	0.66
3/4	29.4	26.2	25.6	23.8	1.04	0.95
7/8	39.8	35.4	34.6	32.2	1.42	1.29
1	51.7	46.0	44.9	41.8	1.85	1.68
1-1/8	65.0	57.9	56.5	52.6	2.34	2.13
1-1/4	79.9	71.0	69.4	64.6	2.89	2.63
1-3/8	96.0	85.4	83.5	77.7	3.50	3.18
1-1/2	114.0	101.0	98.9	92.0	4.16	3.78
1-5/8	132.0	118.0	115.0	107.0	4.88	4.44
1-3/4	153.0	136.0	133.0	124.0	5.67	5.15
1-7/8	174.0	155.0	152.0	141.0	6.50	5.91
2	198.0	176.0	172.0	160.0	7.39	6.72

Swaged Wire Ropes

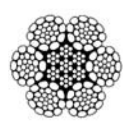
Tuf-Swaged™ Logging Ropes

If your application requires an even stronger rope, Tuf-Swaged rope's 30% higher strength can lead to longer service life. These ropes are designed to resist abrasion and drum crushing in logging applications. The compact design with smoother wire surfaces allows you to spool a greater length of rope onto drums than an unswaged rope of comparable strength.

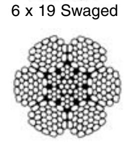
Dia. (in.)	Approx. Wt/Ft (lbs.)	Nominal Strength (tons)
9/16	.89	26.3
5/8	1.04	32.1

6 x 19 and 6 x 36 Classification Swaged Wire Rope

These ropes offer greater strength than standard ropes of the same diameter while providing greater resistance to drum crushing, scrubbing and similar surface wear. To enhance the performance of our swaged ropes in the field, we utilize a special wire chemistry in the outer wires of the strands. Then during production, the rope is rotary swaged to produce a compact cross-section with minimum voids and greater surface area on outer wires. In addition to reducing rope surface wear, this compact design helps reduce wear to sheaves and minimizes crushing of the rope on the drum.



6 x 19 Swaged



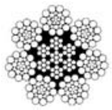
6 x 36 Swaged

Dia. (in.)	Approx. Wt/Ft (lbs.)	Nominal Strength (Tons)
3/8	0.31	9.1
7/16	0.42	12.2
1/2	0.55	16.0
9/16	0.71	20.2
5/8	0.86	24.7
3/4	1.25	35.3
7/8	1.70	47.8
1	2.22	62.0
1-1/8	2.66	78.0

Wire Rope

7 Strand Wire Ropes

726 Wire Ropes



We offer 726 ropes for many applications that currently use 6x19 or 6x36 classification ropes. Their operating characteristics are similar in many ways to 6x36 classification ropes. Typical applications such as container cranes, logging portal cranes and sawmill carriages have reported increased service life with the 726 rope.

The 7 strand construction offers improved resistance to bending fatigue compared to a 6x26 due to a combination of the outer wire size and the seventh strand. These products are also available in a TUF-KOTE® option to further enhance their service characteristics.

Dia, (in.)	Approx. Wt/Ft (lbs.)	Nominal strength (Tons)
3/8	0.26	7.55
1/2	0.46	13.3
9/16	0.59	16.8
5/8	0.72	20.6
3/4	1.04	29.4
7/8	1.42	39.8
1	1.85	51.7
1-1/8	2.34	65.0
1-1/4	2.89	79.9

Galvanized Wire Strand

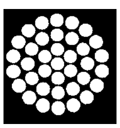
to ASTM A-475

These **zinc-coated steel wire strands** are tested for:

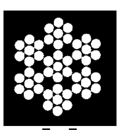
- Minimum breaking strength.
- Elongation (High Strength 5%; Extra High Strength and Utilities Grade 4%).
- Individual wire tolerances.
- Wire coating weight - ASTM Method A90.
- Wire wrap test for coating adherence.
- Wire wrap test for steel ductility.
- Preforming check.

Nominal Dia. of Strand Strand (in.)	No. of Wires	Nominal Dia. of of Coated Wires (in.)	Approx. Wt. of Strand (lb/1000 ft.)	Min. Breaking Strength(lbs) Utilities Grade	High Strength Grade	Extra-High Strength Grade
3/16	7	.062	73	–	2,850	3,990
7/32	7	.072	98	–	3,850	5,400
1/4	7	.080	121	–	4,750	6,650
9/32	7	.093	164	–	6,400	8,950
5/16	7	.104	205	–	8,000*	11,200*
3/8	7	.120	273	11,500*	10,800*	15,400*
7/16	7	.145	399	18,000	14,500*	20,800*
1/2	7	.165	517	25,000	18,800*	26,900*
1/2	19	.100	504	–	19,100	26,700
9/16	7	.188	671	–	24,500	35,000
9/16	19	.113	637	–	24,100	33,700
5/8	7	.207	813	–	29,600	42,400
5/8	19	.125	796	–	28,100	40,200
3/4	19	.150	1,155	–	40,800	58,300
7/8	19	.177	1,581	–	55,800	79,700
1	19	.200	2,073	–	73,200	104,500
1-1/8	37	.161	2,691	–	91,600	130,800
1-1/4	37	.179	3,248	–	113,600	162,200

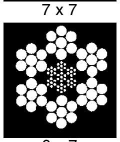
Galvanized Structural Strand & Bridge Rope



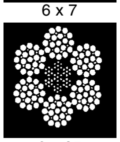
Galvanized Structural Strand to ASTM A-586 *Characteristics:* Less flexible than structural rope; but stronger with a higher modulus of elasticity. Usually supplied prestressed, cut-to-length and paint striped. Polyethylene jacketing also available. *Typical Applications:* Main cables of suspension bridges; boom supports, guys for towers and load carrying members in building structures.



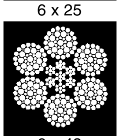
7 x 7



6 x 7



6 x 25



6 x 43

Galvanized Structural Bridge Rope to ASTM A-603 *Characteristics:* Higher modulus of elasticity because strands have longer lays than hoisting ropes of similar construction. Furnished pre-stressed with 20 x 10^6 psi min modulus. Manufactured with Class A zinc coated, high strength wires. *Typical Applications:* Main supporting cables on short-span suspension bridges; suspension cables on large suspension bridges. Roof supports for large buildings .

Order Guide: Galvanized Structural Strand is a special grade strand. It may be ordered in diameters from 1/2" thru 4-3/4"... the galvanized finishes shown in the table above... and in right or left lay.

Galvanized Structural Bridge Rope is a special grade, right regular lay wire rope manufactured of high strength, class A zinc-coated wires. It may be ordered in diameters from 1/2" through 4"... in several constructions and cores.

Galvanized Structural Strand

Strand Dia. (in)†	Nominal Strength (Tons) Class "A" Coating Throughout	Class "A" Coating Inner Wires Class "B" Outer Wires	Class "A" Coating Inner Wires Class "C" Outer Wires	Approx. Metallic Area (In^2)	Approx. Wt/Ft (lbs)
1/2	15.0	14.5	14.2	0.15	0.52
9/16	19.0	18.4	18.0	0.19	0.66
5/8	24.0	23.3	22.8	0.234	0.82
11/16	29.0	28.1	27.5	0.284	0.99
3/4	34.0	33.0	32.3	0.338	1.18
13/16	40.0	38.8	38.0	0.396	1.39
7/8	46.0	44.6	43.7	0.459	1.61
15/16	54.0	52.4	51.3	0.527	1.85
1	61.0	59.2	57.9	0.600	2.10
1-1/16	69.0	66.9	65.5	0.677	2.37
1-1/8	78.0	75.7	74.1	0.759	2.66
1-3/16	86.0	83.4	81.7	0.846	2.96
1-1/4	96.0	94.1	92.2	0.938	3.28
1-5/16	106.0	104.0	102.0	1.03	3.62
1-3/8	116.0	114.0	111.0	1.13	3.97
1-7/16	126.0	123.0	121.0	1.24	4.34
1-1/2	138.0	135.0	132.0	1.35	4.73
1-9/16	150.0	147.0	144.0	1.47	5.13
1-5/8	162.0	159.0	155.0	1.59	5.55
1-11/16	176.0	172.0	169.0	1.71	5.98
1-3/4	188.0	184.0	180.0	1.84	6.43
1-13/16	202.0	198.0	194.0	1.97	6.90
1-7/8	216.0	212.0	207.0	2.11	7.39
1-15/16	230.0	226.0	221.0	2.25	7.89
2	245.0	241.0	238.0	2.40	8.40
2-1/16	261.0	257.0	253.0	2.55	8.94
2-1/8	277.0	273.0	269.0	2.71	9.49
2-3/16	293.0	289.0	284.0	2.87	10.05
2-1/4	310.0	305.0	301.0	3.04	10.64
2-5/16	327.0	322.0	317.0	3.21	11.24
2-3/8	344.0	339.0	334.0	3.38	11.85
2-7/16	360.0	355.0	349.0	3.57	12.48
2-1/2	376.0	370.0	365.0	3.75	13.13
2-9/16	392.0	386.0	380.0	3.94	13.80
2-5/8	417.0	411.0	404.0	4.13	14.47
2-11/16	432.0	425.0	419.0	4.33	15.16
2-3/4	452.0	445.0	438.0	4.54	15.88
2-7/8	494.0	486.0	479.0	4.96	17.36
3	538.0	530.0	522.0	5.40	18.90
3-1/8	584.0	575.0	566.0	5.86	20.51
3-1/4	625.0	616.0	606.0	6.34	22.18
3-3/8	673.0	663.0	653.0	6.83	23.92

Galvanized Structural Strand (cont.)

Strand Dia. (in)†	Nominal Strength (Tons) Class "A" Coating Throughout	Class "A" Coating Inner Wires Class "B" Outer Wires	Class "A" Coating Inner Wires Class "C" Outer Wires	Approx. Metallic Area (In^2)	Approx. Wt/Ft (lbs)
3-1/2	724.0	714.0	702.0	7.35	25.73
3-5/8	768.0	757.0	745.0	7.88	27.60
3-3/4	822.0	810.0	797.0	8.44	29.53
3-7/8	878.0	865.0	852.0	9.01	31.53
4	925.0	911.0	897.0	9.60	33.60
4-1/8	980.0	–	–	10.20	35.70
4-1/4	1040.0	–	–	10.80	37.90
4-3/8	1100.0	–	–	11.50	40.20
4-1/2	1140.0	–	–	11.80	41.30
4-5/8	1230.0	–	–	12.40	43.30
4-3/4	1300.0	–	–	13.00	45.50

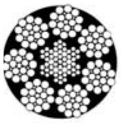
Galvanized Structural (Bridge) Ropes

Rope Dia. (in)	Std. Construction	Nominal Strength* (Tons)	Approx. Metallic Area($in.^2$)	Approx. Wt./Ft. (lbs)
1/2	7 x 7	11.5	0.119	0.42
5/8	7 x 7	18.0	0.182	0.65
3/4	7 x 7	26.0	0.268	0.95
7/8	7 x 7	35.0	0.361	1.28
1	7 x 7	45.7	0.471	1.67
1-1/8	7 x 7	57.8	0.596	2.11
1-1/4	6 x 7 w/ IWRC	72.2	0.745	2.64
1-3/8		87.8	0.906	3.21
1-1/2		104.0	1.08	3.82
1-5/8	6 x 25 FW with IWRC or Strand Core	123.0	1.27	4.51
1-3/4		143.0	1.47	5.24
1-7/8		164.0	1.69	6.03
2		186.0	1.92	6.85
2-1/8		210.0	2.17	7.73
2-1/4		235.0	2.42	8.66
2-3/8		261.0	2.69	9.61
2-1/2		288.0	2.97	10.60
2-5/8		317.0	3.27	11.62
2-3/4		347.0	3.58	12.74
2-7/8	6 x 43 FW with IWRC or Strand Core	379.0	3.91	13.90
3		412.0	4.25	15.11
3-1/4		475.0	5.04	18.00
3-1/2		555.0	5.83	21.00
3-3/4		640.0	6.67	24.00
4		730.0	7.59	27.00

*Acceptance strength is not less than 2-1/2% below the nominal strengths listed.

Wire Rope

Plastic Filled Valley Wire Rope

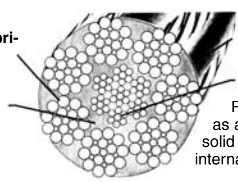


Key to PFV® Wire Rope's benefits lie in its exclusive patented fabrication. Standard, lubricated Macwhyte® Wire Rope is used in the extrusion process where the "gaps" (or valleys) between the individual rope strands are impregnated with a sealing thermoplastic-material. Each strand "valley" (or interstice) in the finished rope is equally filled with plastic. The finished rope may have a thin "skin coating" of plastic but this has no significant effect on the outside diameter of the PFV rope or its serviceability.

Result: PFV® Wire Rope is balanced, sealed-lubricated wire rope that delivers exceptional performance and service life, particularly on applications that produce severe operating conditions such as: whipping, peening, slapping, scrubbing, poor spooling and heavy bearing pressure. Additional advantages of PFV® Wire Rope include increased spark resistance (to reduce chance of fire or combustion)... noise reduction... and higher strength.

Plastic Filled Valleys reduce wire-contact stress – PFV Wire Rope provides load transfer and sharing between wires and strands unequaled by conventional wire rope. This promotes continued flexibility, and reduces interstrand nicking.

Plastic Filled Valleys keep lubrication inside wire rope – Macwhyte Plastic Filled Valley wire rope locks in lubrication to insure greater flexibility. Increased endurance. And improved wire-rope life.



Plastic Filled Valleys provide greater wear area – Compared to ordinary wire rope, PFV Wire Rope assures smoother wearing surfaces. Adapts to grooves and close tolerances. Minimizes bend stress over sheaves. Increases fatigue life.

Plastic Filled Valleys reduce internal corrosion – PFV Wire Rope's plastic impregnation acts as a shield to prevent infiltration of solid abrasives, which could cause internal deterioration.

Rope Dia. (in)	PREmium GRADE							
	6X19 IWRC		6X37 IWRC		7-FLEX IWRC		19X7	
	N.S	WT.	N.S.	WT.	N.S.	WT.	N.S.	WT.
5/16	–	–	–	–	5.19	.19	–	–
3/8	7.55	.27	7.55	.27	7.44	.27	6.15	.27
7/16	10.20	.37	10.20	.37	10.10	.37	8.33	.36
1/2	13.30	.49	13.30	.49	13.10	.49	10.80	.47
9/16	16.80	.61	16.80	.61	16.50	.61	13.60	.60
5/8	20.60	.76	20.60	.76	20.30	.76	16.80	.75
3/4	29.40	1.09	29.40	1.09	29.00	1.09	24.00	1.07
7/8	39.80	1.49	39.80	1.49	39.30	1.49	32.50	1.46
1	51.70	1.94	51.70	1.94	51.00	1.94	42.20	1.91
1-1/8	65.00	2.46	65.00	2.46	64.20	2.46	53.10	2.42
1-1/4	79.90	3.03	79.90	3.03	78.90	3.03	65.10	2.98
1-3/8	96.00	3.67	96.00	3.67	94.90	3.67	78.40	3.60
1-1/2	114.00	4.37	114.00	4.37	112.00	4.37	92.80	4.28
1-5/8	132.00	5.12	132.00	5.12	131.00	5.12	–	–
1-3/4	153.00	5.94	153.00	5.94	152.00	5.94	–	–
1-7/8	174.00	6.82	174.00	6.82	173.00	6.82	–	–
2	198.00	7.76	198.00	7.76	196.00	7.76	–	–
2-1/8	221.00	8.77	221.00	8.77	–	–	–	–
2-1/4	247.00	9.83	247.00	9.83	–	–	–	–
2-3/8	274.00	10.90	274.00	10.90	–	–	–	–

N.S. = Nominal Strengths are listed in Tons of 2,000 pounds.

Wt. = Approximate weight in pounds per foot.

NOTE: Nominal strengths apply only to new, unused PFV wire rope. Any performance specifications are conditional on proper rope size, construction, and grade; on proper design and maintenance of mechanical equipment on which wire rope products are used; and and on proper storage, handling, use, maintenance and periodic inspection of such products during the period of use.

Corrosion Resistant Cable

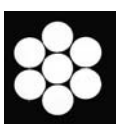
Materials Used

Carbon Steel (Aircraft Cable), normally galvanized, has the highest strength and greatest fatigue resistance. Also available with tin coating. This material is the most widely used for small-diameter cables.

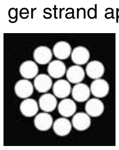
Galvanized Iron, actually low carbon steel, is relatively soft and is suitable for light-duty applications. It is not a suitable grade for hoisting or for use over pulleys.

Stainless Steel - 18-8 grade is generally as strong as galvanized aircraft cable with added corrosion resistance to many substances. Type 302 is the standard alloy for cables. Molybdenum-bearing stainless steel (Type 316) for extra corrosion resistance and non-magnetic stainless steel (Type 305) are also available. Their strengths are 10 to 15% less than Type 302 cables.

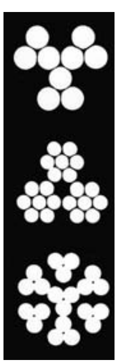
Phosphor Bronze has less strength than stainless steel but is widely used for applications where resistance to salt water and atmospheric corrosion are important. Its non-sparking characteristic is also advantageous.



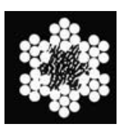
1 x 7 - Available in sizes from below 1/64" to above 1/2" diameter. Small sizes are useful as dial cable, fishing lines and leaders; 1/32" through 1/8" sizes are for light-duty guying; and larger sizes are sufficiently stiff for guy strand and messenger strand applications.



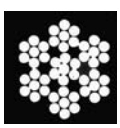
1 x 19 - Designed primarily for standing rigging on boats, bracing and other non-flexible requirements, it is adaptable to use with swage-type cable terminals.



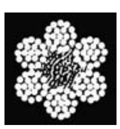
3 x 3
3 x 7
7 x 3 - These constructions are used mainly for cables less than 1/16" diameter. Extremely flexible in this range, they are suitable for commercial fishing cable, dial cable and light-duty controls in aircraft and aircraft components.



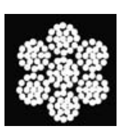
6 x 7 (fiber core) - Its moderate flexibility is suitable for use over pulleys. This construction is also used for guying or standing rigging. It has less strength than 1 x 19 strand but is more flexible and more easily spliced.



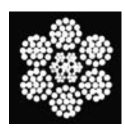
7 x 7 - The standard flexible "specification" aircraft cable in 1/16" and 3/32" sizes. High strength and rugged construction make it useful for towing and transmission of mechanical power. Larger sizes are sufficiently stiff for guying and messenger cable, and strand core makes it suitable for use with swage-type terminals.



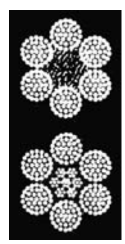
6 x 19 (fiber core) - This fiber core construction, with excellent strength, flexibility, and resistance to abrasion and fatigue, is the standard hoisting cable.



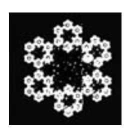
7 x 19 - The "specification" flexible aircraft cable in 1/8" through 3/8" sizes, this construction has high strength and resistance to crushing loads. It is available in some materials down to 1/16" diameter for extreme flexibility but has less durability due to the very small wire necessary for construction.



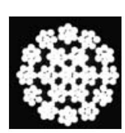
6 x 19 – 7 x 7 IWRC - With the same characteristics as 7 x 19, plus greater flexibility, this construction is specified for aircraft use in the 7/16" and larger sizes.



6 x 37 (fiber core)
6 x 37 – 7 x 7 IWRC - More flexible than 6 x 19, although not as durable, these cables are useful where pulleys or drums must be limited in size.



6 x 42 (fiber centers and core) - Also designated as 6 x 6 x 7 and widely known as "tiller rope" this is the most flexible of all standard constructions. Used primarily for hand lines or steering cables where crushing loads or abrasive factors are not heavy enough to require the more rugged types.



19 x 7 - Designed to counteract the natural tendency of cable to rotate when freely suspended under load, this construction is useful for one-part hoists.

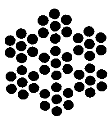
Cable

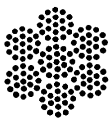
Aircraft Cable

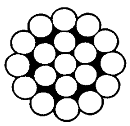
Preformed, made in accordance with commercial specifications military and federal specification rope available.

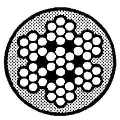
Carbon Steel (Aircraft Cable) - Galvanized cable has the highest strength and greatest fatigue life of the materials offered. It has good to fair corrosion resistance in rural to industrial atmosphere environments. This material is most widely used for small diameter cables. Tin over galvanized cable offers greater corrosion resistance and reduced friction over pulleys.

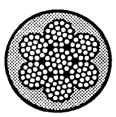
Galvanized Iron (Low Carbon Steel) - This is relatively soft and suitable for light-duty applications. Very good for seizing, but not recommended for hoisting or use over pulleys.


7 x 7


7 x 19


1 x 19


7 x 7


7 x 19

7 x 7		Galvanized Min. Breaking Strengths (lbs)	Stainless Steel Min. Breaking Strength (lbs)
Dia. (In)	Approx. Wt 1000 Ft/lbs		
1/16	7.5	480	480
3/32	16.	920	920
1/8	28.5	1,700	1,700
5/32	43.	2.600	2,400
3/16	62.	3,700	3,700
1/4	106.	6,100	6,100
5/16	167.	9,200	9,000
3/8	236.	13,300	12,600

7 x 19		Galvanized Min. Breaking Strengths (lbs)	Stainless Steel Min. Breaking Strength (lbs)
Dia. (In)	Approx. Wt 1000 Ft/lbs		
3/32	17.	1,000	920
1/8	29.	2,000	1,760
5/32	45.	2,800	2,400
3/16	65.	4,200	3,700
7/32	86.	5,600	5,000
1/4	110.	7,000	6,400
9/32	139.	8,000	7,800
5/16	173.	9,800	9,000
3/8	243.	14,400	12,000

1 x 19		Galvanized Min. Breaking Strengths (lbs)	Stainless Steel Min. Breaking Strength (lbs)
Dia. (In)	Approx. Wt 1000 Ft/lbs		
1/16	8.5	500	500
3/32	20	1,200	1,200
1/8	35	2,100	2,100
5/32	55	3,300	3,300
3/16	77	4,700	4,700
1/4	135	8,200	8,200
5/16	210	12,500	12,500
3/8	300	18,000	17,500

Vinyl Coated Galvanized Aircraft Cable				
Dia. (in)	Coated to (in)	Construction	Approx. Wt/Ft (lbs)	Min. Breaking Strength (lbs)
3/32	3/16	7 x 7	28	920
1/8	3/16	7 x 7	39	1,700
1/8	3/16	7 x 19	39	2,000
3/16	1/4	7 x 19	78	4,200
1/4	5/16	7 x 19	125	7,000
3/8	7/16	7 x 19	272	14,400

Galvanized Extra High Strength Strand			
Nominal Dia. Strand Strand (in)	No.of Wires In Strand	Approx. Wt. of Strand lb/1000 ft	Min. Breaking Strength of Strand (lbs) Extra High Strength Grade
1/8	1 x 7	32	1,830
5/32	1 x 7	51	2,940
3/16	1 x 7	73	3,990
7/32	1 x 7	98	5,400
1/4	1 x 7	121	6,650
9/32	1 x 7	164	8,950
5/16	1 x 7	205	11,200
3/8	1 x 7	273	15,400
7/16	1 x 7	399	20,800
1/2	1 x 7	517	26,900
1/2	1 x 19	504	26,700
9/16	1 x 7	671	35,000
9/16	1 x 19	637	33,700
5/8	1 x 7	813	42,400
5/8	1 x 19	796	40,200
3/4	1 x 19	1155	58,300

Cable

Stainless Steel Cables

Type 302/304 - Type 302/304 stainless steel is the standard alloy for cable. It has about the same strength as galvanized aircraft cable and much better corrosion resistance. It has excellent corrosion resistance in most industrial atmospheres, and good corrosion resistance in sea water and marine atmospheres. Type 302/304 also has very good corrosion resistance to many chemicals including nitric acid.

Type 305 - Type 305 has better corrosion resistance than Type 302 with 10-15% lower strength. This alloy is primarily used for nonmagnetic cable applications. When sufficiently cold worked, this alloy does not become magnetic.

Type 316 - Type 316 is the standard high corrosion resistant alloy for cable. It is resistant to many of the chemicals in the paper pulp, photographic, food processing and textiles industries. It has the best pitting resistance in marine use of the commonly used stainless steels. The breaking strength is 10-15% below Type 302. Excellent scale resistance allows its continuous use at temperatures up to 900° F.

Corrosion Resistance - Chromium in stainless steels is the primary reason for their corrosion resistance. The chrome protects the surface by quickly forming an impervious, tenacious oxide film. This acts as a protective barrier against attack. Nickel improves the oxide forming ability of chromium and also gives the stainless steel a broader range of corrosion resistance.

Diameter (In)	Breaking Strength (lbs)	Wt (lbs) M Feet
1 x 7 TYPE 302/304 - Stainless Steel Strand		
.012	25	0.33
.015	40	0.55
.018	55	0.73
.021	80	1.00
.024	100	1.30
.027	125	1.70
1/32	185	2.30
.038	250	3.50
3/64	375	5.50
1/16	500	8.50
5/64	800	14.00
3/32	1200	20.00
7/64	1600	27.00
1/8	2100	35.00
5/32	3300	55.00
3/16	4700	77.00
7/32	6300	103.00
1/4	8500	135.00
9/32	10700	170.00
5/16	13200	212.00
3/8	18000	282.00
7/16	26000	416.00
1/2	33700	535.00
1 x 19		
1/32	185	2.5
3/64	335	5.5
1/16	500	8.5
5/64	800	14.0
3/32	1200	20.0
7/64	1600	27.0
1/8	2100	35.0
5/32	3300	55.0
3/16	4700	77.0
7/32	6300	102.0
1/4	8200	135.0
9/32	10300	170.0
5/16	12500	210.0
3/8	17500	300.0
7/16	22500	410.0
1/2	30000	521.0
9/16	36200	670.0
5/8	47000	855.0

Diameter (In)	Breaking Strength (lbs)	Wt (lbs) M Feet
3 x 3 TYPE 302/304 - Stainless Steel Cable		
.021	40	0.5
3 x 7		
1/32	110	1.7
5/64	650	9.7
6 x 19 IWRC		
7/16	16300	356.0
1/2	22800	458.0
9/16	28500	590.0
5/8	35000	715.0
3/4	49600	922.0
7/8	66500	1430.0
1	85400	1870.0
1-1/8	106400	2400.0
1-1/4	129400	2900.0
6 x 37 IWRC		
3/16	3000	65.0
1/4	5400	100.0
5/16	8300	180.0
3/8	11700	240.0
7/16	15800	330.0
1/2	20800	430.0
9/16	25600	540.0
5/8	31400	670.0
3/4	44400	960.0

Diameter (In)	Breaking Strength (lbs)	Wt (lbs) M Feet
6 x 37 IWRC *(continued)*		
7/8	59700	1310.0
1	77300	1700.0
1-1/8	96600	2160.0
1/1/4	118400	2660.0
6 x 4 *Non-Preformed*		
1/8	700	18.0
3/16	1600	40.0
1/4	3200	70.0
5/16	4900	110.0
3/8	6900	160.0
7/16	9300	210.0
1/2	12000	280.0
9/16	15000	350.0
5/8	18400	430.0
7 x 3		
.018	40	0.5
.024	60	1.0
.031	110	1.7
7 x 7		
.031	115	2.0
3/64	270	4.2
1/16	480	7.5
5/64	650	11.0
3/32	920	16.0
7/64	1260	22.0
1/8	1700	28.5
5/32	2400	43.0
3/16	3700	62.0
7/32	5000	83.0
1/4	6400	106.0
9/32	7800	134.0
5/16	9000	167.0
3/8	12000	236.0
7/16	15600	342.0
1/2	21300	440.0
9/16	26600	550.0
5/8	32500	680.0
3/4	46000	970.0
7 x 19		
3/64	270	4.2
1/16	480	7.5
3/32	920	16.0
7/64	1260	22.0
1/8	1760	29.0
5/32	2400	45.0
3/16	3700	65.0
7/32	5000	86.0
1/4	6400	110.0
9/32	7800	139.0
5/16	9000	173.0
3/8	12000	243.0
19 x 7 *Non-Rotating*		
1/8	1500	29.0
5/32	2160	45.0
3/16	3330	65.0
7/32	4500	86.0
1/4	5760	110.0
5/16	8100	173.0
3/8	10800	243.0
7/16	13800	356.0
1/2	20520	458.0
9/16	24200	590.0
5/8	31500	715.0

Diameter (In)	Breaking Strength (lbs)	Wt (lbs) M Feet
6 x 19 TYPE 305 - IWRC Stainless Steel *Non-Magnetic*		
7/16	14900	356.0
1/2	19300	458.0
9/16	24300	590.0
5/8	30100	715.0
3/4	42900	1052.0
7/8	58000	1430.0
1	75200	1870.0
7 x 7		
1/16	360	7.5
3/32	700	16.0
7 x 19		
1/8	1300	29.0
5/32	2000	45.0
3/16	2900	65.0
7/32	3800	86.0
1/4	4900	110.0
9/32	6100	139.0
5/16	7600	173.0
3/8	11000	243.0

Diameter (In)	Breaking Strength (lbs)	Wt (lbs) M Feet
1 x 7 TYPE 316 - Stainless Steel Strand		
7/32	5700	103.0
1/4	7650	135.0
9/32	9650	170.0
5/16	11900	212.0
3/8	16200	282.0
7/16	23400	416.0
1/2	30200	535.0
1 x 19		
1/8	1780	35.0
5/32	2800	55.0
3/16	4000	77.0
7/32	5350	102.0
1/4	6900	135.0
9/32	9400	170.0
5/16	10600	210.0
3/8	14800	300.0
7/16	20000	410.0
1/2	27000	521.0
9/16	32400	670.0
5/8	42000	855.0

Diameter (In)	Breaking Strength (lbs)	Wt (lbs) M Feet
6 x 19 Type 316 - IWRC Stainless Steel		
7/16	15000	356.0
1/2	19300	458.0
5/8	29800	715.0
7 x 7		
3/64	240	4.2
1/16	360	7.5
3/32	700	16.0
1/8	1360	28.5
7 x 19		
1/8	1300	29.0
5/32	2000	45.0
3/16	2900	65.0
1/4	4900	110.0
5/16	7600	173.0
3/8	11000	243.0

Diameter (In)	Breaking Strength (lbs)	Wt (lbs) M Feet
1 x 7 Annealed Stainless Steel Seizing Strand		
1/32	60	2.3
3/64	130	5.3
1/16	230	8.5
5/64	360	14.0
3/32	500	20.0
1/8	900	33.0
5/32	1350	50.0

Cable

Other Alloys

Phosphor Bronze - Has less strength than stainless steel, and is often used in marine applications. It will tarnish, but has good corrosion resistance to saltwater. Bronze cable is also used for antenna applications. Its non-sparking property is advantageous in hazardous locations. *Grade E is the standard material for phosphor bronze cables. When Federal Specification RRW410 is called for, Grade A Bronze material is required.*

Monel - Has a slightly hIgher strength than phosphor bronze and has very good corrosion resistance to many chemicals that attack stainless steels. Monel is used in hydrofluoric acid, caustic solutions and high velocity seawater applications.

Specialty Alloys - Other grades of stainless steel, inconel or other alloys are available for cable production, where unusual factors justify their manufacture. Inquire for price, availability, and delivery.

6 x 42 *Non-Preformed*	Monel Cable	
Diameter (In)	**Breaking Strength (lbs)**	**Wt (lbs) M Feet**
1/8	440	20.0
3/16	995	45.0
1/4	1750	80.0
5/16	2750	120.0
3/8	3950	180.0
7 x 7 *Preformed*		
3/64	135	4.4
1/16	220	8.5
3/32	480	18.0
1/8	850	32.0
3/16	1900	70.0
1/4	3400	118.0
7 x 19 *Preformed*		
3/32	480	18.0
1/8	875	33.0
5/32	1350	52.0
3/16	1950	70.0
1/4	3500	124.0
5/16	5450	195.0
3/8	7850	270.0
6 x 7 *Non-Preformed*	**Grade E Phosphor Bronze**	
1/32	40	1.8
3/64	85	4.1
1/16	150	7.0
3/32	340	16.0
1/8	600	28.0
5/32	910	44.0
3/16	1320	63.0
1/4	2280	106.0
5/16	3520	170.0
6 x 19 *Non-Preformed*		
1/8	615	29.0
3/16	1370	66.0
1/4	2380	112.0
5/16	3670	175.0
3/8	5240	252.0
7/16	7080	343.0
1/2	9210	450.0
9/16	11500	570.0
6 x 42 *Non-Preformed*		
1/8	335	20.0
3/16	760	45.0
1/4	1350	80.0
5/16	2070	120.0
3/8	2960	180.0
7/16	4020	240.0
1/2	5190	305.0

7 x 7 *Preformed*	Grade E Phosphor Bronze	
Diameter (In)	**Breaking Strength (lbs)**	**Wt (lbs) M Feet**
1/32	43	2.0
3/64	90	4.4
1/16	170	8.5
3/32	375	18.0
1/8	660	32.0
5/32	1000	48.0
3/16	1450	70.0
7 x 19 *Preformed*		
1/8	660	35.0
3/16	1470	70.0
1/4	2560	124.0

Coated Cable

The coating of cables with nylon or other plastic offers a number of advantages. It lengthens the life of a cable by protecting the wires from abrasion; it seals in cable lubricant and seals out grit, dirt and moisture. It protects pulleys and drums from abrasion. It also protects hands, clothing, fabrics or other soft materials which may come In contact with or be used in conjunction with cable.

Nylon is the strongest and toughest coating material. It is available in several grades, depending on whether flexibility, toughness, hardness, outdoor exposure, high or low temperature or chemical resistance is the primary consideration. Vinyl coatings offer additional advantages. Generally, compared with nylon, they are more flexible, have better resistance to sunlight and are less expensive. Mechanically, however, their uses are somewhat more limited.

7 x 7 *Preformed*	Galvanized NYLON COATED		
Bare Cable (In)	**Nylon Outer Dia. (In)**	**Breaking Strength (lbs)**	**Wt. (lbs) M Feet**
3/64	1/16	270	4.9
1/16	3/32	480	9.3
1/16	1/8	480	11.8
3/32	1/8	920	18.5
3/32	5/32	920	21.8
3/32	3/16	920	25.8
7 x 19			
3/32	1/8	920	18.5
1/8	3/16	2000	36.2
3/16	1/4	4200	75.1
3/16	5/16	4200	100.0
1/4	5/16	7000	123.0
1/4	3/8	7000	141.0
5/16	13/32	9800	198.0
3/8	15/32	14400	272.0

7 x 7 Stainless Steel NYLON COATED *Preformed* Type 302			
Bare Cable (In)	**Nylon Outer Dia. (In)**	**Breaking Strength (lbs)**	**Wt. (lbs) M Feet**
3/64	1/16	270	4.9
1/16	3/32	480	9.3
1/16	1/8	480	11.8
3/32	1/8	920	18.5
3/32	5/32	920	21.8
3/32	3/16	920	25.8
7 x 19			
1/16	3/32	480	9.3
3/32	1/8	920	20.0
3/32	5/32	920	23.0
1/8	3/16	1760	36.2
5/32	7/32	2400	61.0
3/16	1/4	3700	75.1
1/4	5/16	6400	128.0
1/4	3/8	6400	141.0

Extra-Quality NYLON-COATED Stainless Steel Cable*				
Dia. Bare Cable	**Dia. Nylon O.D.**	**Construction**	**Strength (lbs)**	**Wt. (lbs) 1000 ft.**
1/32	3/64	3 x 7	110	2.2
3/64	1/16	7 x 7	270	4.9
1/16	1/8	7 x 7	480	11.8
3/32	3/16	7 x 7	920	25.8
1/8	3/16	7 x 19	1760	36.2
5/32	7/32	7 x 19	2400	53.7
3/16	1/4	7 x 19	3700	75.1
1/4	5/16	7 x 19	6400	123.

Extra-Quality NYLON-COATED Galvanized Aircraft Cable*				
Dia. Bare Cable	**Dia. Nylon O.D.**	**Construction**	**Strength (lbs)**	**Wt. (lbs) 1000 ft.**
1/32	3/64	3 x 7	110	2.2
3/64	1/16	7 x 7	270	4.9
3/64	3/32	7 x 7	270	6.6
1/16	3/32	7 x 7	480	9.3
1/16	1/8	7 x 7	480	11.8
3/32	1/8	7 x 7	920	18.5
3/32	5/32	7 x 7	920	21.8
3/32	3/16	7 x 7	920	25.8
3/32	1/8	7 x 19	920	18.5
1/8	5/32	7 x 19	2000	32.3
1/8	3/16	7 x 19	2000	36.2
1/8	7/32	7 x 19	2000	41.
5/32	1/4	7 x 19	2800	59.1
3/16	1/4	7 x 19	4200	75.1
3/16	5/16	7 x 19	4200	88.2
3/16	3/8	7 x 19	4200	104.1
7/32	9/32	7 x 19	5600	97.6
1/4	5/16	7 x 19	7000	123.
9/32	3/8	7 x 19	8000	161.8
5/16	13/32	7 x 19	9800	198.
3/8	15/32	7 x 19	14400	272.

VINYL COATED Galvanized Aircraft Cable*				
Dia. (In)	**Coated to (In)**	**Construction**	**Approx. Wt 1000 ft/lbs**	**Min. Breaking Strength (lbs)**
3/32	3/16	7 x 7	28	920
1/8	3/16	7 x 7	39	1,700
1/8	3/16	7 x 19	39	2,000
3/16	1/4	7 x 19	78	4,200
1/4	5/16	7 x 19	125	7,000
3/8	7/16	7 x 19	272	14,400

1 x 19 *Preformed*	Stainless Steel WHITE VINYL COATED Type 302		
Bare Cable (In)	**Nylon Outer Dia. (In)**	**Breaking Strength (lbs)**	**Wt. (lbs) M Feet**
3/32	3/16	1200	30.0
1/8	7/32	2100	47.0
1/8	1/4	2100	51.0
3/16	5/16	4700	103.0
1/4	7/16	8200	189.0
7 x 7			
1/16	1/8	480	13.5
3/32	1/8	920	20.0
3/32	5/32	920	24.0
3/32	3/16	920	28.0
1/8	5/32	1700	33.0
1/8	7/32	1700	41.0
1/8	1/4	1700	45.0
5/32	7/32	2400	59.0
3/16	1/4	3700	80.0
3/16	5/16	3700	92.0
1/4	3/8	6100	145.0
1/4	7/16	6100	154.0
7 x 19			
1/8	3/16	1700	43.0
5/32	7/32	2400	61.0
3/16	1/4	3700	83.0

* Cables can be supplied with coatings to other diameters. Cables of other construction, size and material can also be manufactured with a nylon or other plastic coating.

Glossary

ABRASION Frictional surface wear on the wires of a wire rope.

ACCELERATION STRESS The additional stress that is imposed on a wire rope as a result of an increase in the load velocity.

AGGREGATE STRENGTH The strength derived by totalling the individual breaking strengths of the elements of the strand or rope. This strength does not recognize the reduction in strength resulting from the angularity of the elements in the rope, or other factors that may affect efficiency.

AIRCRAFT CABLES Strands, cords and wire ropes made of special-strength wire, designed primarily for use in various aircraft industry applications.

AREA, METALLIC Sum of the cross-sectional areas of all the wires either in a wire rope or in a strand.

BAIL a) U-shaped member of a bucket, or b) U-shaped portion of a socket or other fitting used on wire rope.

BASKET OF SOCKET The conical portion of a socket into which a broomed-rope-end is inserted and then secured.

BECKET An end attachment to facilitate wire rope installation.

BECKET LOOP A loop of small rope or strand fastened to the end of a larger wire rope. Its function is to facilitate wire rope installation.

BENDING STRESS Stress that is imposed on the wires of a strand or rope by a bending or curving action.

BIRDCAGE A colloquialism descriptive of the appearance of a wire rope forced into compression. The outer strands form a cage and, at times, displace the core.

BLOCK A term applied to a wire rope sheave (pulley) enclosed in side plates and fitted with some attachment such as a hook or shackle.

BOOM HOIST LINE Wire rope that operates the boom hoist system of derricks, cranes, draglines, shovels, etc.

BOOM PENDANTS A non-operating rope or strand with end termination to support the boom.

BREAKING STRENGTH Breaking Strength is the ultimate load at which a tensile failure occurs in the sample of wire rope being tested. (Note: The term breaking strength is synonymous with actual strength.) Minimum Acceptance Strength is that strength which is 2-1/2% lower than the catalog or nominal strength. This tolerance is used to offset variables that occur during a sample preparation and actual physical test of a wire rope. Nominal Strength is the published (catalog) strength calculated by a standard procedure that is accepted by the wire rope industry. The wire rope manufacturer designs wire rope to this strength, and the user should consider this strength when making design calculations.

BRIDGE CABLE (Structural Rope or Strand) The all-metallic wire rope or strand used as the catenary and suspenders on a suspension bridge.

BRIDGE SOCKET A wire rope or strand end termination made of forged or cast steel that is designed with baskets-having adjustable bolts-for securing rope ends. There are two styles: 1) the closed type has a U-bolt with or without a bearing block in the U of the bolt, and 2) the open type has two eye-bolts and a pin.

BRIGHT ROPE Wire rope fabricated from wires that are not coated.

CABLE A term loosely applied to wire rope, wire strand and electrical conductors.

CABLE-LAID WIRE ROPE A type of wire rope consisting of several wire ropes laid into a single wire rope (e.g., 6x42 (6x6x7) tiller rope).

CABLE TOOL DRILLING LINE The wire rope used to operate the cutting tools in the cable tool drilling method (i.e., rope drilling).

CENTER The axial member of a strand about which the wires are laid.

CHOKER ROPE A short wire rope sling that forms a slip noose around an object that is to be moved or lifted.

CLASSIFICATION Group, or family designation based on wire rope constructions with common strengths and weights listed under the broad designation.

CLIP Fitting for clamping two parts of wire rope to each other.

CLOSED SOCKET A wire rope end termination consisting of basket and bail made integral.

CLOSER A machine that lays strands around a core to form rope.

CLOSING LINE Wire rope that performs two functions: 1) closes a clamshell or orange peel bucket, and 2) operates as a hoisting rope.

COIL Circular bundle or package of wire rope that is not affixed to a reel.

CONSTRUCTION Geometric design description of the wire rope's cross section. This includes the number of STRANDS, the number of WIRES per strand and the pattern of wire arrangement in each STRAND.

CONSTRUCTIONAL STRETCH The stretch that occurs when the rope is loaded-it is due to the helically laid wires and strands creating a constricting action that compresses the core and generally brings all of the rope's elements into close contact.

CORE The axial member of a wire rope about which the strands are laid.

CORROSION Chemical decomposition of the wires in a rope through the action of moisture, acids, alkalines or other destructive agents.

CORROSION-RESISTING STEEL Chrome-nickel steel alloys designed for increased resistance to corrosion.

CORRUGATED Term used to describe the grooves of a SHEAVE or DRUM after these have been worn down to a point where they show an impression of a wire rope.

CREEP The unique movement of a wire rope with respect to a drum surface or sheave surface resulting from the asymmetrical load between one side of the sheave (drum) and the other. It is not dissimilar to the action of a caterpillar moving over a flat surface. It should be distinguished from slip which is yet another type of relative movement between rope and the sheave or drum surface.

CROWD ROPE A wire rope used to drive or force a power shovel bucket into the material that is to be handled.

DEAD-LINE In drilling, it is the end of the rotary drilling line fastened to the anchor or dead-line clamp.

DECELERATION STRESS The additional stress that is imposed on a wire rope as a result of a decrease in the load velocity.

DESIGN FACTOR In a wire rope, it is the ratio of the nominal strength to the total working load.

DIAMETER A line segment which passes through the center of a circle and whose end points lie on the circle. As related to wire rope it would be the diameter of a circle which circumscribes the wire rope.

DOG-LEG Permanent bend or kink, in a wire rope, caused by improper use or handling.

DRAGLINE a) Wire rope used for pulling excavating or drag buckets, and b) name applied to a specific type of excavator.

DRUM A cylindrical flanged barrel, either of uniform or tapering diameter, on which rope is wound either for operation or storage; its surface may be smooth or grooved.

EFFICIENCY Ratio of a wire rope's actual breaking strength and the aggregate strength of all individual wires tested separately-usually expressed as a percentage.

ELASTIC LIMIT Stress limit above which permanent deformation will take place within the material.

END PREPARATION The treatment of the end of a length of wire rope designed primarily as an aid for pulling the rope through a reeving system or tight drum opening. Unlike END TERMINATIONS, these are not designed for use as a method for making a permanent connection.

END TERMINATION The treatment at the end or ends of a length of wire rope, usually made by forming an eye or attaching a fitting and designed to be the permanent end termination on the wire rope that connects it to the load.

ENDLESS ROPE Rope with ends spliced together to form a single continuous loop.

EQUALIZING SHEAVE The sheave at the center of a rope system over which no rope movement occurs other than equalizing movement. It is frequently overlooked during crane inspections, with disastrous consequences. It can be a source of severe degradation.

EXTRA IMPROVED PLOW, STEEL ROPE A specific wire rope grade.

EYE OR EYE SPLICE A loop, with or without a thimble, formed at the end of a wire rope.

FACTOR OF SAFETY In the wire rope industry, this term was originally used to express the ratio of nominal strength to the total working load. The term is no longer used since it implies a permanent existence for this ratio when, in actuality, the rope strength begins to reduce the moment it is placed in service. See DESIGN FACTOR.

FATIGUE As applied to wire rope, the term usually refers to the process of progressive fracture resulting from the bending of individual wires. These fractures may and usually do occur at bending stresses well below the ultimate strength of the material; it is not an abnormality although it may be accelerated due to conditions in the rope such as rust or lack of lubrication.

FIBER CENTER Cord or rope of vegetable or synthetic fiber used as the axial member of a strand.

FIBER CORE Cord or rope of vegetable or synthetic fiber used as the axial member of a rope.

FILLER WIRE Small spacer wires within a strand which help position and support other wires. Also the name for the type of strand pattern utilizing filler wires.

FITTING Any functional accessory attached to a wire rope.

FLAT ROPE Wire rope that is made of a series of parallel, alternating right-lay and left-lay ropes, sewn together with relatively soft wires.

FLATTENED STRAND ROPE Wire rope that is made either of oval or triangular shaped strands in order to form a flattened rope surface.

FLEET ANGLE That angle between the rope's position at the extreme end wrap on a drum, and a line drawn perpendicular to the axis of the drum through the center of the nearest fixed sheave. See DRUM and SHEAVE.

GALVANIZED Zinc coating for corrosion resistance.

GRADE Wire rope or strand classification by strength and/or type of material, i.e., Improved Plow Steel, Type 302 Stainless, Phosphor Bronze, etc. It does not imply a strength of the basic wire used to meet the rope's nominal strength.

GRADES, ROPE Classification of wire rope by the wire's metallic composition and the rope's nominal strength.

GROMMET An endless circle or ring fabricated from one continuous length of strand or rope.

GROOVED DRUM Drum with a grooved surface that accommodates the rope and guides it for proper winding.

GROOVES Depressions-helical or parallel-in the surface of a sheave or drum that are shaped to position and support the rope.

GUY LINE Strand or rope, usually galvanized, for stabilizing or maintaining a structure in fixed position.

HAULAGE ROPE Wire Rope used for pulling movable devices such as cars that roll on a track.

HAWSER Wire rope, usually galvanized, used for towing or mooring marine vessels.

HOLDING LINE Wire rope on a clamshell or orange peel bucket that suspends the bucket while the closing line is released to dump its load.

IDLER Sheave or roller used to guide or support a rope.

Glossary

IMPROVED PLOW STEEL ROPE A specific grade of wire rope.

INDEPENDENT WIRE ROPE CORE (IWRC) A wire rope used as the axial member of a larger wire rope.

INNER WIRES All wires of a strand except the outer or cover wires.

INTERNALLY LUBRICATED Wire rope or strand having all of its wire components coated with lubricants.

KINK A unique deformation of a wire rope caused by a loop of rope being pulled down tight. It represents irreparable damage to and an indeterminate loss of strength in the rope.

LAGGING a) External wood covering on a reel to protect the wire rope or strand, or b) the grooved shell of a drum.

LAY a)The manner in which the wires in a strand or the strands in a rope are helically laid, or b) the distance measured parallel to the axis of the rope (or strand) in which a strand (or wire) makes one complete helical convolution about the core (or center). In this connection, lay is also referred to as LAY LENGTH or PITCH.

LAY TYPES

1) *Right Lay:* The direction of strand or wire helix corresponding to that of a right hand screw thread.
2) *Left Lay:* The direction of strand or wire helix corresponding to that of a left hand screw thread.
3) *Cross Lay:* Rope or strand in which one or more operations are performed in opposite directions. A multiple operation product is described according to the direction of the outside layer.
4) *Regular Lay:* The type of rope wherein the lay of the wires in the strand is in the opposite direction to the lay of the strand in the rope. The crowns of the wires appear to be parallel to the axis of the rope.
5) *Lang Lay:* The type of rope in which the lay of the wires in the strand is in the same direction as the lay of the strand in the rope. The crowns of the wires appear to be at an angle to the axis of the rope.
6) *Alternate Lay:* Lay of a wire rope in which the strands are alternately regular and lang lay.
7) *Alberts Lay:* An old, rarely used term for lang lay.
8) *Reverse Lay:* Another term for alternate lay.
9) *Spring Lay:* This is not definable as a unique lay; more properly, it refers to a specific wire rope construction.

LEAD LINE That part of a rope tackle leading from the first, or fast, sheave to the drum.

LINE Synonymous term for WIRE ROPE.

LOCKED COIL STRAND Smooth-surfaced strand ordinarily constructed of shaped, outer wires arranged in concentric layers around a center of round wires.

LOOP A 360° change of direction in the course of a wire rope which when pulled down tight will result in a kink.

MARTENSITE A brittle micro-constituent of steel formed when the steel is heated above its critical temperature and rapidly quenched. This occurs in wire rope as a result of frictional heating and the mass cooling effect of the cold metal beneath. Martensite cracks very easily, and such cracks can propagate from the surface through the entire wire.

MILD PLOW STEEL ROPE A specific grade of wire rope.

MILKING Sometimes called IRONING, it is the progressive movement of strands along the axis of the rope, resulting from the rope's movement through a restricted passage such as a tight sheave.

MODULUS OF ELASTICITY Mathematical quantity expressing the ratio, within the elastic limit, between a definite range of unit stress on a wire rope and the corresponding unit elongation.

MOORING LINES Galvanized wire rope, usually 6x12, 6x24, or 6x37 class for holding ships to dock.

NON-PREFORMED Rope or strand that is not preformed. See PREFORMED STRANDS and PREFORMED ROPE.

NON-ROTATING WIRE ROPE Term, now abandoned, referring to 19 x 7 or 18 x 7 rope.

NON-SPINNING WIRE ROPE See ROTATION RESISTANT ROPE.

OPEN SOCKET A wire rope fitting that consists of a basket and two ears with a pin. See FITTING.

OUTER WIRES Outer layer of wires.

PEENING Permanent distortion resulting from cold plastic metal deformation of the outer wires. Usually caused by pounding against a sheave or machine member, or by heavy operating pressure between rope and sheave, rope and drum, or rope and adjacent wrap of rope.

PLOW STEEL ROPE A specific grade of wire rope.

PREFORMED STRANDS Strand in which the wires are permanently formed during fabrication into the helical shape they will assume in the strand.

PREFORMED WIRE ROPE Wire rope in which the strands are permanently formed during fabrication into the helical shape they will assume in the wire rope.

PRESTRESSING An incorrect reference to PRESTRETCHING.

PRESTRETCHING Subjecting a wire rope or strand to tension prior to its intended application, for an extent and over a period of time sufficient to remove most of the CONSTRUCTIONAL STRETCH.

PROPORTIONAL LIMIT As used in the rope industry, this term has virtually the same meaning as ELASTIC LIMIT. It is the end of the load versus elongation relationship at which an increase in load no longer produces a proportional increase in elongation and from which point recovery to the rope's original length is unlikely.

RATED CAPACITY The load which a new wire rope or wire rope sling may handle under given operating conditions and at an assumed DESIGN FACTOR.

REEL A flanged spool on which wire rope or strand is wound for storage or shipment.

REEVE To pass a rope through a hole or around a system of sheaves.

RESERVE STRENGTH The strength of a rope exclusive of the outer wires.

REVERSE BEND Reeving a wire rope over sheaves and drums so that it bends in opposing directions.

ROLLERS Relatively small-diameter cylinders, or wide-faced sheaves, that serve as support for ropes.

ROTARY LINE On a rotary drilling rig, it is the wire rope used for raising and lowering the drill pipe, as well as for controlling its position.

ROTATION-RESISTANT ROPE A wire rope consisting of an inner layer of strand laid in one direction covered by a layer of strand laid in the opposite direction. This has the effect of counteracting torque by reducing the tendency of finished rope to rotate.

ROUND-WIRE TRACK STRAND Strand composed of concentric layers of round WIRES, used as TRACK CABLE.

SAFETY FACTOR See DESIGN FACTOR.

SAFE WORKING LOAD This term is potentially misleading and is, therefore, in disfavor. Essentially, it refers to that portion of the nominal rope strength that can be applied either to move or sustain a load. It is misleading because it is only valid when the rope is new and equipment is in good condition. See RATED CAPACITY.

SAND LINE In well drilling, it is the wire rope that operates the bailer that removes water and drill cuttings.

SEALE The name for a type of strand pattern that has two adjacent layers laid in one operation with any number of uniform sized wires in the outer layer and with the same number of uniform but smaller sized wires in the inner layer.

SEIZE To make a secure binding at the end of a wire rope or strand with SEIZING WIRE or SEIZING STRAND.

SERVE To cover the surface of a wire rope or strand with a fiber cord or wire wrapping.

SHACKLE A U-or anchor-shaped fitting with pin.

SHEAVE A grooved pulley for wire rope.

SLING, WIRE ROPE An assembly fabricated from WIRE ROPE which connects the load to the lifting device.

SLING,BRAIDED A flexible sling, the body of which is made up of two or more WIRE ROPES braided together. See SLINGS.

SMOOTH-FACED DRUM Drum with a plain, ungrooved surface. See DRUM.

SOCKET Generic name for a type of wire rope fitting.

SPIN RESISTANT An abandoned term referring to a ROTATION-RESISTANT rope of the 8 x 19 classification.

SPIRAL GROOVE A continuous helical groove that follows a path on and around a drum face, similar to a screw thread. See DRUM.

SPLICING

1) Making a loop or eye in the end of a rope by tucking the ends of the strands back into the main body of the rope.
2) Formation of loops or eyes in a rope by means of mechanical attachments pressed onto the rope.
3) Joining of two rope ends so as to form a long or short splice in two pieces of rope.

STAINLESS STEEL ROPE Wire rope made up of corrosion resistant steel wires.

STRAND A plurality of round or shaped wires helically laid about an axis.

STRANDER A machine that lays wires together helically to form a strand.

STRESS The force or resistance within any solid body against alteration of form; in the case of a solid wire it would be the load on the rope divided by the cross-section area of the wire.

STRETCH The elongation of a wire rope under load.

SWAGED FITTING Fitting into which wire rope can be inserted and then permanently attached by cold pressing (swaging) the shank that encloses the rope.

TAG LINE A small wire rope used to prevent rotation of a load.

THIMBLE Grooved metal fitting to protect the eye, or fastening loop of a wire rope.

TRACK CABLE On an aerial system it is the suspended wire rope or strand along which the carriers move.

TRACTION ROPE On an aerial conveyor or haulage system it is the wire rope that propels the carriages.

TRACTION STEEL ROPE A specific grade of wire rope.

TRAMWAY An aerial conveying system for transporting multiple loads.

TURN Synonymous with the term WRAP; it signifies a single wrap around a drum.

WARRINGTON The name for a type of strand pattern that is characterized by having one of its wire layers (usually the outer) made up of an arrangement of alternately large and small wires.

WEDGE SOCKET Wire rope fittings wherein the rope end is secured by a wedge.

WIRE (ROUND) A single, continuous length of metal, with a circular cross-section that is cold-drawn from rod.

WIRE ROPE A plurality of wire strands helically laid about an axis.

WIRE STRAND CORE (WSC) A wire strand used as the axial member of a wire rope.