CONTENTS

CERTEX


BISSO MARINE CO.
T & T MARINE SALVAGE
D-B CAPPY BISSO

GENERAL CAUTIONS AND WARNINGS

All products supplied and manufactured by CERTEX are sold with the express understanding that the purchaser is thoroughly familiar with the safe and proper use and application of the product.

Responsibility for the use and application of the products rests with the user.

Failure of the product can occur due to misapplication, abuse, or improper maintenance. Product failure could allow the load to become out of control, resulting in possible property damage, personal injury or death.

There are numerous government and industry standards that cover products sold by CERTEX. This catalog makes no attempt to reference all of them. We do reference the standards that are most frequently asked about.

Ratings Shown in CERTEX literature are applicable only to new or "in as new" condition products.

Load limit ratings indicate the greatest force or load a product can carry under usual environmental conditions. Shock loading and extraordinary conditions must be taken into account when selecting products for use in a system.

In general, the products displayed in CERTEX literature are used as parts of a system being employed to accomplish a task. Therefore, we can only recommend within the Working Load Limits, or other stated limitations, the use of products for this purpose.

The Working Load Limit, or Design Factor, or Efficiency Rating of each CERTEX-supplied product may be affected by wear, misuse, overloading, corrosion, deformation, intentional alteration, and other use conditions. Regular inspection must be conducted to determine whether use can be continued at the catalog assigned WLL, a reduced WLL, or whether the product must be withdrawn from service.

CERTEX products generally are intended for tension or pull. Side loading must be avoided, as it exerts additional force or loading which the product is not designed to accommodate.

Welding CERTEX-supplied load support parts or products can be hazardous. Knowledge of materials, heat treatment, and welding procedures are necessary for proper welding. CERTEX should be consulted for information.

The assigned Ultimate Load Rating of CERTEX-supplied products for the reeving of wire, manila, or synthetic ropes is based upon design; the catalog ultimate strength for the rope parts, when totaled, may exceed the assigned Ultimate Load Rating.

⚠ **WARNING:** Prop 65: Products supplied by CERTEX USA may expose you to chemicals including Nickel, which is known to the State of California to cause cancer, For more information, go to **www.P65Warnings.ca.gov**

Limited Warranty

The Working Load Limit of a sling must not exceed the lowest Working Load Limit of the components in the system.

Purchaser and CERTEX expressly agree that CERTEX's warranty with respect to sale of its products is LIMITED solely to CERTEX's choice of repair, replacement or refund of the purchase price of any product or part thereof determined by CERTEX to be defective within the first 12 months following the transfer of title of the product from CERTEX to the purchaser. Purchaser and CERTEX expressly agree that upon termination of the aforementioned 12 month period, the purchased product carries no warranty whatsoever. Purchaser and CERTEX expressly agree that the remedies provided in this section are the purchaser's exclusive remedies in connection with the purchase or use of the product. Purchaser and CERTEX expressly agree that in no event shall CERTEX be liable for any incidental or consequential damages in connection with the purchase or use of the product.

> ALL OTHER WARRANTIES, INCLUDING EXPRESS WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. PURCHASER HEREBY WAIVES ALL OTHER WARRANTIES, RIGHTS AND REMEDIES ARISING BY LAW OR OTHERWISE INCLUDING, BUT NOT LIMITED TO, EXPRESS WARRANTIES, THE IMPLIED WARRANTY OF MERCHANTABILITY, ANY IMPLIED WARRANTIES ARISING FROM COURSE OF PERFORMANCE, COURSE OF DEALING OR USAGE OF TRADE, AND IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. ADDITIONALLY, CERTEX HEREBY DISCLAIMS ANY OF ITS OBLIGATIONS OR LIABILITIES ARISING FROM STATUTE, WARRANTY, CONTRACT, TORT OR NEGLIGENCE.

Complete Agreement: This Warranty between purchaser and CERTEX is complete. All prior or contemporaneous discussions, representations and/or understandings are merged into this Warranty. All prior or contemporaneous agreements between parties are superseded by this Warranty.

Wire Rope Design and Construction

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.

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

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

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

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

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

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. Bridon American 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.

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

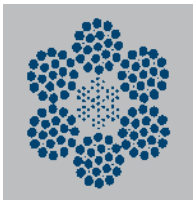
Wire Grades
The most common steel wire grades are: IPS (Improved Plow Steel), EIP (Extra Improved Plow Steel) and EEIP (Extra Extra Improved Plow Steel). Stainless Steels and other special grades are provided for special applications.

Most wire ropes are made with round wires. Both triangular and shaped wires are also used for special constructions.

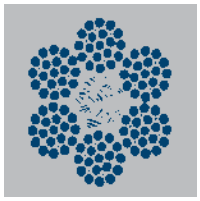
Generally, the higher the strength of the wire, the lower its ductility will be.

INSTALLATION, OPERATION AND MAINTENANCE RECOMMENDATIONS

Wire Rope Design and Construction



Core
IWRC (Independent Wire Rope Core) provides good crush resistance and increased strength.



Fiber Core provides excellent flexibility.

Regular Lay

Definition
Most common lay in which the wires wind in one direction and the strands the opposite direction. (right lay shown)

Characteristics
Less likely to kink and untwist; easier to handle; more crush resistant than lang lay.

Lang Lay

Definition
Wires in strand and strands of rope wind the same direction. (right lay shown)

Characteristics
Increased resistance to abrasion; greater flexibility and fatigue resistance than regular lay; will kink and untwist.

Right Lay

Definition
Strands wound to the left around the core. (regular lay shown)

Characteristics
Used in a few special situations – cable tool drilling line, for example.

Right Lay Left Lay

Definition
Strands wound to the left around the core. (regular lay shown)

Characteristics
Used in a few special situations – cable tool drilling line, for example.

Alternate Lay

Definition
Alternate strands of right regular lay and right lang lay.

Characteristics
Combines the best features of regular and lang lay for boom hoist or winch lines.

INSTALLATION, OPERATION AND MAINTENANCE RECOMMENDATIONS

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.

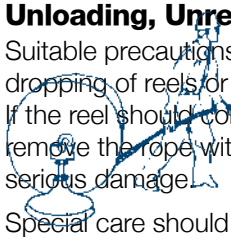
DRAGGING wire rope over a bank or some other object results in localized wear, which means shorter life.

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. Bridon American engineers and field service specialists are available to provide advice in specific situations. Our technology and experience are as close as your telephone.

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.

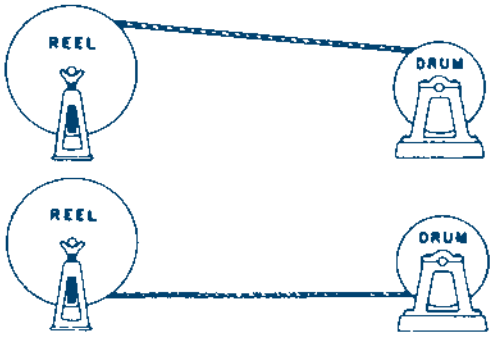
Special care should be taken in unreeling wire rope to avoid kinking, which can result in permanent damage to the rope. The reel should be mounted on jacks or a turntable so that it will move freely. It should be unreeled straight and under enough tension to keep it from starting a loop.

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

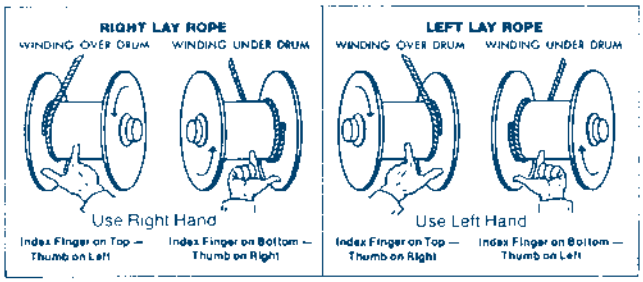
Proper practices for transferring rope from reel to drum:

- 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.

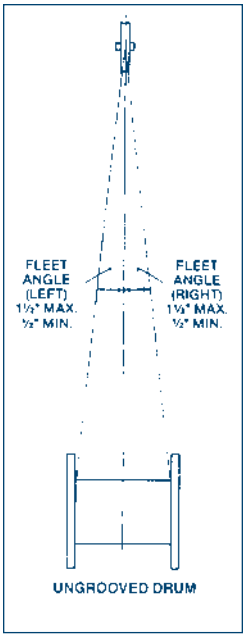


- Use enough tension to avoid kinking.
- There is usually only one way to install rope on a grooved drum.

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.



INSTALLATION, OPERATION AND MAINTENANCE RECOMMENDATIONS



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

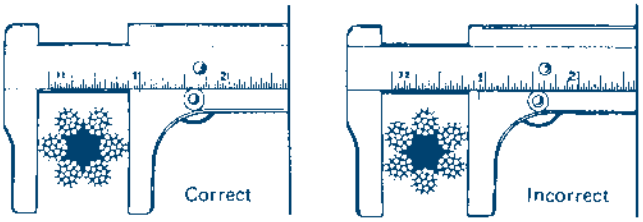
Factory lubrication is not always sufficient to last the useful life of wire rope. Periodic field lubrication may be required to minimize friction and provide corrosion protection. Important guides for field lubrication:

- 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.

BriLube® is recommended for relubing ropes.

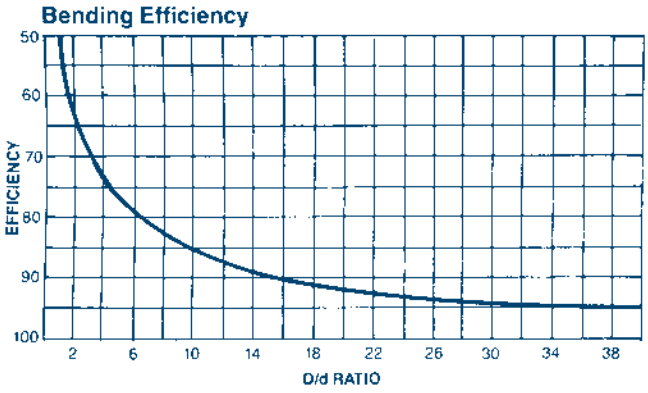
Measuring Wire Rope Diameter



INSTALLATION, OPERATION AND MAINTENANCE RECOMMENDATIONS

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.



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 your local Branch for specific recommendations.

Sheave Diameter Factors	
Suggested Minimum *D/d Ratios *D-Sheave Tread Diameter d-Nominal Rope Diameter	
Rope Construction	**Minimum**
6 x 74	2
19 x 73	4
6 x 19 S3	4
6 x 21 FW	30
6 x 25 FW	26
6 x 36 FW	23
8 x 25 FW	21
6 x 41 WS	21

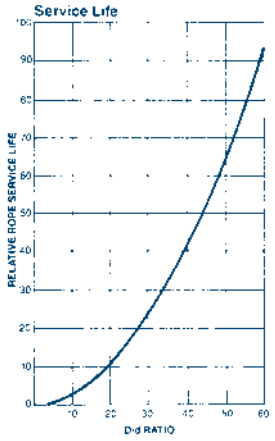
Service life increases as the D/d ratio becomes larger. This curve, based on bending and tensile stresses only, illustrates the relative performance increase.

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.

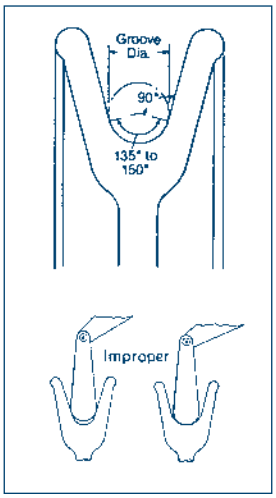
Wire ropes are manufactured slightly larger than nominal size. Maximum allowable oversize tolerances are shown in the following table.



Nominal Rope Diameter inches	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%

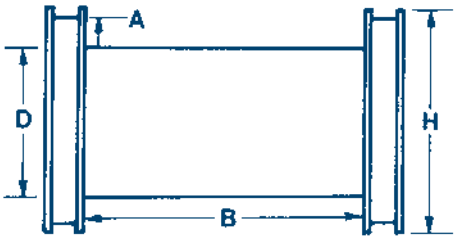
INSTALLATION, OPERATION AND MAINTENANCE RECOMMENDATIONS

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.

$L = (A + D) \times A \times B \times K$

K = Constant obtained by dividing .2618 by the square of the actual rope diameter.

$A \frac{H-D}{2}$ – Desired clearance, in inches.

B = Traverse in inches.

D = Barrel Diameter in inches.

H = Flange Diameter in inches.

L = Rope length in feet.

Values of K			
Rope Dia.	**K**	**Rope Dia.**	**K**
1/4"	3.29	1 1/2"	0.107
5/16"	2.21	1 5/8"	0.0886
3/8"	1.58	1 3/4"	0.077
7/16"	1.19	1 7/8"	0.0675
1/2"	.925	2"	0.0597
9/16"	.741	2 1/8"	0.0532
5/8"	.607	2 1/4"	0.0476
3/4"	.428	2 3/8"	0.0421
7/8"	.308	2 1/2"	0.038
1"	.239	2 5/8"	0.0345
1 1/8"	0.191	2 3/4"	0.0314
1 1/4"	0.152	2 7/8"	0.0287
1 3/8"	0.127	3"	0.0264

INSPECTION OF WIRE ROPE AND 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.

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 19 x 7 and 8 x 19, 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 determination made as to whether further use of

INSPECTION OF WIRE ROPE AND STRUCTURAL STRAND

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 in 30 rope diameters and 2 in 6 rope diameters)

INSPECTION OF WIRE ROPE AND STRUCTURAL STRAND

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	Nominal Rope Diameters
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 your nearest CERTEX location.

For further information on wire rope inspection refer to the American Iron & Steel Institute's Wire Rope Users Manual.

WIRE ROPE LUBRICATION & PRESERVATION

Introduction

Steel wire ropes are used in a wide variety of applications and environments.

Many ropes are of complex construction and designed to meet specific engineering applications.

The ultimate working life of a wire rope is dependent upon many factors, but effective in-service lubrication and corrosion protection are fundamental parts of planned maintenance.

The selection of the correct lubricant designed to meet the requirements of the application, environment and rope design is vital if maximum benefit from in-service lubrication is to be obtained.

Bridon gives advice on the specific rope lubricants best suited to any application.

High pressure lubricators, which greatly assist both cleaning and re-lubrication are available and Bridon will advise on their suitability for any particular application.

General Operational Categories

Most ropes have a lubricant incorporated during manufacture, to prevent corrosion during shipment and storage, and to provide internal lubrication during the early part of the rope's working life.

However, wire ropes are like any other machine and lubrication and corrosion protection must be maintained for optimum life to be achieved. Such service maintenance is termed re-lubrication.

It is important that the lubricant used are formulated specifically for wire rope maintenance and are compatible with the manufacturing lubricant. The particular environment and application must be considered in order to select the most appropriate type of lubricant. For example, modern multi-strand ropes require a lubricant with good penetration properties which will fill the small interstrand spaces and penetrate as far into the rope as possible.

A. Ropes working in industrial outdoor environments where corrosion is the predominant cause of deterioration.
Internal corrosion leading to fatigue initiation is the major concern in these applications.

B. Ropes working on friction hoists.
Lubrication to combat corrosion and internal wear is necessary without risking the loss of frictional grip.

C. Ropes working over sheaves but not subject to heavy surface abrasion or corrosion.

D. Ropes working in conditions of heavy wear.
Here abrasion is the predominant cause of failure.

E. Standing ropes and working ropes subject to heavy loading in marine or other corrosive environments.

In this case corrosion and abrasive wear combine to form the major causes of failure.

These wide variations in working conditions call for fundamentally different types of lubricant. Specific properties are needed to achieve optimum rope performance. In some cases, a combination of a solvent based corrosion preventative, designed to achieve penetration and moisture displacement, followed by the application of a heavier protective coating can be used to achieve optimum corrosion protection combined with good lubrication.

General Guidelines On Lubricating Ropes

A. For maximum benefit, the lubricant should be applied as soon as the rope is put to work.

B. The lubricant should be re-applied at regular intervals, preferably before the rope shows signs of corrosion or dryness. Frequency of application depends on the actual site conditions and the periods indicated in each section in this information sheet are for guidance only.

C. If the existing lubricant on the rope is heavily loaded with foreign matter (dirt, sand, grit etc.), the rope should be cleaned before fresh lubricant is applied. Pressure cleaning and relubricating systems are the most effective methods.

D. The loose products of corrosion should be brushed off before fresh lubricant is applied. If the external wires in the rope are heavily corroded, or if there is reason to believe that there is severe internal corrosion, the rope must be examined by a qualified person and, if necessary, discarded.

E. The lubricant and application should be such that a thin even adherent coat covers all the wires in the rope.

It must be emphasized that these comments are general recommendations, applicable to round, triangular strand and multi-strand ropes used in similar applications to those indicated. They do not apply to certain specialized ropes such as locked coil ropes, where specific recommendations can be made on request. Extensive research has been carried out into lubrication of ropes under a wide variety of usages and environmental conditions and Bridon will be pleased to advise rope users on specific problems.

WIRE ROPE LUBRICATION & PRESERVATION

Selection Of In-Service Lubricants

A. Ropes working in industrial or outdoor environments

Typical examples are:

- MOBILE AND TOWER CRANES
- CONTAINER CRANES

In such applications there is always the possibility of internal as well as external corrosion. Of the two the former is more serious because it is hidden. There is the possibility of moisture entrapment if an incorrect lubricant is used, as it is usually difficult to dry the rope prior to dressing.

It should be noted that many apparent fatigue type failures in such applications are initiated by corrosion.

The lubricant must:

- Penetrate inside the rope – the most difficult part of the rope to inspect
- Displace moisture from internal and external surfaces
- Give good corrosion protection, internally and externally
- Be resistant to wash-off and emulsification
- Not lead to build-up with repeated applications

The best lubricant for such applications are solvent based, which after evaporation leave a semi-dry waxy film which is reasonably thick (0.01 mm typically). These lubricants must have specific anti-corrosion properties, they must be tenacious and the resulting film should be semi-dry to minimize pick-up of abrasive particles e.g. sand, which can combine with an oil lubricant to promote internal wear.

Lubricants containing chlorinated hydrocarbon solvents such as trichlorethylene or carbon tetrachloride are NOT recommended.

Lubricants containing ‘dry lubricants’ such as molybdenum disulphide and graphite are NOT recommended as these compounds tend to dry out leading to surface film breakdown and consequent exposure of wire surfaces to the atmosphere.

Dressings should be applied by drip feed, spray or pressure application, usually at no more than monthly intervals.

B. Ropes working on friction hoists

Typical examples are:

- ELEVATORS
- FRICTION HOISTS
- CAPSTAN WINCHES

These ropes are subject to corrosion and wear and yet application of conventional lubricants can lead to severe loss of traction resulting in slip.

Traditionally these ropes are lubricated very little in service due to the conflicting problems of lubrication and slip. Lubricant applied during manufacture is kept to a minimum for this reason.

The only lubricants satisfactory for this application are those designed to provide corrosion protection and internal lubrication while minimizing loss of frictional grip or actually increasing the coefficient of friction.

A solvent based dressing which deposits a thin slip-resistant semi-dry film is the best solution.

In addition, moisture displacement and the prevention of excessive lubricant build-up are important. Lubricants should be applied by brush, spray or automatic feed, at monthly intervals.

Unless a specific anti-slip dressing is used, great care must be taken to ensure that slip is not generated by over application.

C. Ropes working under conditions of low abrasive wear and corrosion

Typical examples are:

- ELECTRIC OVERHEAD CRANES
- WIRE ROPE HOISTS
- INDOOR CRANES
- SMALL EXCAVATORS
- PILING, PERCUSSION AND DRILLING EQUIPMENT

Such ropes are subject to internal wear, leading to fatigue failures of wires.

For these applications the best lubricants provide maximum lubrication internally and externally.

Lubricants using a mineral oil base, SAE 30, are generally accepted as the best. However basic oils provide very little corrosion protection and are subject to excessive run-off and fling-off. It is recommended, therefore, that a specific oil based rope lubricant with a tackiness additive and anti-corrosion properties be selected.

Compounds containing ‘dry lubricants’ such as molybdenum disulphide and graphite have been shown to provide no increase in fatigue life in wire ropes over

WIRE ROPE LUBRICATION & PRESERVATION

and above that provided by mineral oils. Application should be by brush, spray or drip feed whenever the rope appears dry.

D. Ropes working in conditions of heavy wear

Typical examples are:

Onshore:

- EXCAVATORS
- WINCHES
- HAULAGE APPLICATIONS

Offshore

- MOORING SYSTEMS
- DREDGERS

Under these conditions he primary requirements for rope lubricants are:

- Good adhesion to the rope to prevent fling-off and loss of coating.
- Resistance to removal by mechanical forces. A lubricant that dries and cracks will scrape off or fall off in bending. Some bituminous compounds can 'cement' broken wires in place making inspection more difficult.
- Good anti-wear properties.

In addition the lubricant must be resistant to moisture, emulsification and ultra-violet degradation.

Good corrosion protection is essential, particularly in offshore conditions.

Further preferred properties are ease of application and a stable physical nature over a wide temperature range.

The lubricants are petroleum-gel based, with thixotropic characteristics. Such compounds provide good lubrication over a wide range of temperatures and do not crack or craze in ultra-violet light. Their thixotropic properties enable good adherence and continuity on the side of the rope, combined with good lubricity under shearing stress.

A further feature of thixotropic lubricants is the ease with which they penetrate the rope through the use of pressure lubricators.

Such lubricants are designed for long working life and infrequent application. Relubricating should take place as required depending upon the intensity of usage and the severity of the environment.

Standing ropes and working ropes subject to heavy loading in corrosive environments.

Typical examples are:

Onshore:

- GUY ROPES
- PENDANT ROPES

Offshore:

- TOWING CABLES
- CRANES AND DERRICKS
- TRAWL WARPS

Under these conditions ropes are subject to extended periods of corrosive attack in standing situations. In some applications, such as offshore cranes, the ropes are required to undertake heavy duty lifting work after extended periods at rest.

The primary requirements for rope lubricants in such applications are:

- High corrosion protection
- Long term stability of the lubricant
- Good adhesion to the rope, even when wet
- Resistance to wash-off, emulsification and mechanical removal

Only lubricants which provide high corrosion resistance should be used and the lubricants should remain stable over extended periods of time over wide temperature ranges.

Resistance to cracking and ultra-violet degradation is necessary for long term protection.

Lubricants with similar characteristics to those in section (d), but with high corrosion protection characteristics, are recommended.

Traditional bituminous compounds are not recommended as service lubricants because they can trap moisture in the core, and may not act as lubricants when a rope is put to work after extended periods in a static situation, due to hardening. Such compounds are only effective as lubricants when applied during manufacture, usually heated and under pressure.

Thixotropic gels are the most suitable lubricants as they provide excellent protection against the environment, good lubrication under dynamic operation and operation and return to a semi-solid coherent lubricant at rest. Re-lubrication of a used rope can often be improved by an initial application of a solvent based

WIRE ROPE LUBRICATION & PRESERVATION

corrosion preventative lubricant which penetrates and displaces moisture in the rope.

Lubricants Available

There is a wide range of compounds on the market. Some of these are specific to wire rope applications and others are multi-purpose products which can offer some benefits to wire ropes.

Bridon's own brand of wire rope lubricants, the BriLube® range, has been developed especially for wire rope. Based upon extensive experience in wire rope usage, there is a BriLube® product to meet most applications mentioned in this document.

Detailed technical data, catalog and supplies of BriLube® are available from authorized Bridon distributors.

CERTEX

The New Standard in Lifting Products and Services

In the field of lifting, CERTEX means certainty. From simple, straight forward hardware and custom-made assemblies, to complete lifting management programs, the name CERTEX represents quality, safety, service and expertise. CERTEX companies are your trusted local source for lifting products and services, backed by world-wide experience and expertise to solve any lifting problem.

Wherever people are at work building, producing and moving the world's goods, CERTEX means certainty.

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.

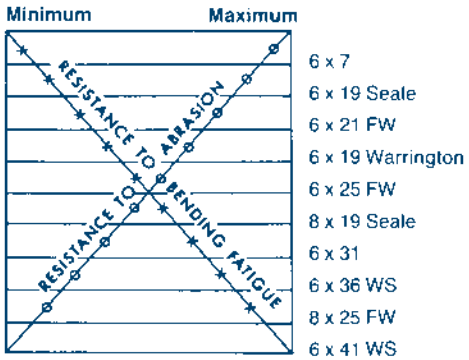
Fatigue Resistance

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.

Abrasion Resistance

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



Crush Resistance

An IWRC (Independent wire rope core) and large outer wires will provide best crush resistance. Bridon American's Constructex rope provides the best crush resistance of any wire rope.

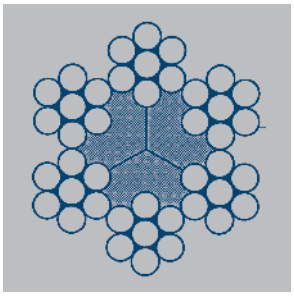
Flexibility

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

Generally Accepted Design Factors	
Type of Service	**Minimum Factor**
Guy Ropes	3.5
Overhead and Gantry Cranes	5.0
Jib and Pillar Cranes	5.0
Derricks	3.5
Wire Rope Slings	5.0
Miscellaneous 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

Relative Bending Life Factors of Typical Ropes	
Rope Construction	**Factor**
6 x 7	.57
19 x 7	.67
6 x 19 S	.80
6 x 21 FW	.92
Dyform-18 and 6 x 25 FW	1.00
6 x 31 WS	1.09
Dyform-6 and 6 x 36 WS	1.31
8 x 25 FW	1.39
6 x 41 WS	1.39
6 x 49 SWS	1.54

6 x 7 Classification



6 x 7 Rope

Characteristics
Excellent abrasion resistance;
less bending fatigue resistance

Typical Applications
Dragging and haulage in mines, inclined planes and tramways, sand lines.
IWRC shown; fiber core available

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.

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.

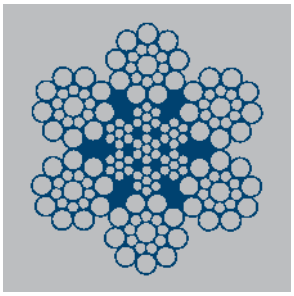
Diameter, in.	6 x 7 Classification Rope					
	Nominal Strength,* Tons (Bright or Drawn Galvanized)†				Approximate Wt./Ft., lb.	
	EIP				IWRC	Fiber Core
	CERTEX Cat. Ref. No.	IWRC	CERTEX Cat. Ref. No.	Fiber Core		
1/4	CX01-0600	3.27	CX01-0614	2.90	0.10	0.094
5/16	CX01-0601	5.07	CX01-0615	4.51	0.16	0.15
3/8	CX01-0602	7.25	CX01-0616	6.45	0.23	0.21
7/16	CX01-0603	9.80	CX01-0617	8.72	0.32	0.29
1/2	CX01-0604	12.8	CX01-0618	11.3	0.42	0.38
9/16	CX01-0605	16.1	CX01-0619	14.3	0.53	0.48
5/8	CX01-0606	19.7	CX01-0620	17.5	0.65	0.59
3/4	CX01-0607	28.1	CX01-0621	25.0	0.92	0.84
7/8	CX01-0608	38.0	CX01-0622	33.8	1.27	1.15
1	CX01-0609	49.1	CX01-0623	43.7	1.65	1.50
1 1/8	CX01-0610	61.5	CX01-0624	54.8	2.09	1.90
1 1/4	CX01-0611	75.4	CX01-0625	67.1	2.57	2.34
1 3/8	CX01-0612	90.4	CX01-0626	80.4	3.12	2.84
1 1/2	CX01-0613	107.0	CX01-0627	94.8	3.72	3.38

**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.

WARNING: Any warranties, expressed or implied, concerning the use of this product apply only to the nominal strength of new, unused wire rope. All equipment using this product must be properly used and maintained. Wire rope must be properly stored, handled, used and maintained. Most importantly, wire rope must be regularly inspected during use. Damage, abuse or improper maintenance can cause rope failure. Consult the AISI Wire Rope Users Manual, ASME or ANSI Standards, before usage. Wire rope removal criteria are based on the use of steel sheaves. If synthetic sheaves are used, consult the sheave equipment manufacturer. **WARNING!**

GENERAL PURPOSE WIRE ROPES

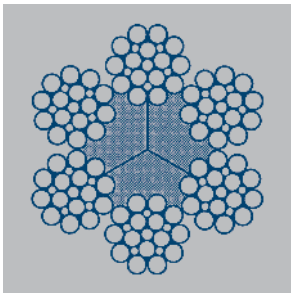
6 x 19 Classification



6 x 19 Seale

Characteristics
Resistant to abrasion and crushing; medium fatigue resistance

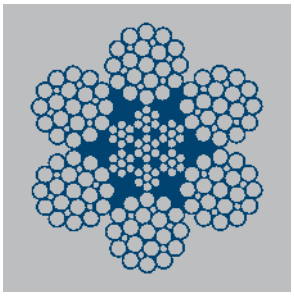
Typical Applications
Haulage rope, choker rope, rotary drilling line
IWRC shown; fiber core available



6 x 21 Filler Wire

Characteristics
Less abrasion resistance; more bending fatigue resistance

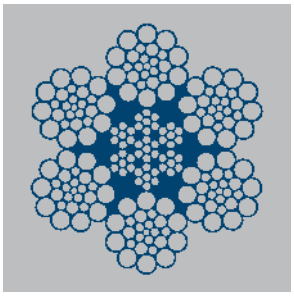
Typical Applications
Pull Ropes, load lines, backhaul ropes, draglines
Fiber core shown; IWRC available



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 rope - 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

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.

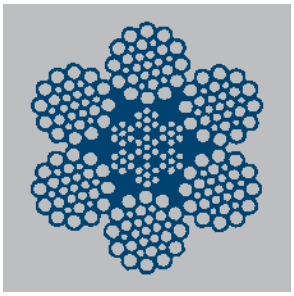
6 x 19 Classification Rope										
Diameter, in.	Nominal Strength,* Tons (Bright or Drawn Galvanized)†								Approximate Wt./Ft., lb.	
	EEIP				EIP				IWRC	Fiber Core
	CERTEX Cat. Ref. No.	IWRC	CERTEX Cat. Ref. No.	Fiber Core	CERTEX Cat. Ref. No.	IWRC	CERTEX Cat. Ref. No.	Fiber Core		
1/4		—		—	CX01-0059	3.40	CX01-0634	3.02	0.116	0.105
5/16		—		—	CX01-0060	5.27	CX01-0635	4.69	0.18	0.164
3/8		—		—	CX01-0061	7.55	CX01-0636	6.71	0.26	0.236
7/16	CX01-0029	11.2	CX01-0044	9.90	CX01-0062	10.2	CX01-0637	9.09	0.35	0.32
1/2	CX01-0030	14.6	CX01-0045	12.9	CX01-0063	13.3	CX01-0638	11.8	0.46	0.42
9/16	CX01-0031	18.5	CX01-0046	16.2	CX01-0064	16.8	CX01-0639	14.9	0.59	0.53
5/8	CX01-0032	22.7	CX01-0047	20.0	CX01-0065	20.6	CX01-0640	18.3	0.72	0.66
3/4	CX01-0033	32.4	CX01-0048	28.6	CX01-0066	29.4	CX01-0641	26.2	1.04	0.95
7/8	CX01-0034	43.8	CX01-0049	39.0	CX01-0067	39.8	CX01-0642	35.4	1.42	1.29
1	CX01-0035	56.9	CX01-0050	50.6	CX01-0068	51.7	CX01-0643	46.0	1.85	1.68
1 1/8	CX01-0036	71.5	CX01-0051	63.6	CX01-0069	65.0	CX01-0644	57.9	2.34	2.13
1 1/4	CX01-0037	87.9	CX01-0052	78.2	CX01-0070	79.9	CX01-0645	71.0	2.89	2.63
1 3/8	CX01-0038	106.0	CX01-0053	94.0	CX01-0071	96.0	CX01-0646	85.4	3.50	3.18
1 1/2	CX01-0039	125.0	CX01-0054	111.0	CX01-0072	114.0	CX01-0647	101.0	4.16	3.78
1 5/8	CX01-0040	146.0	CX01-0055	129.0	CX01-0073	132.0	CX01-0648	118.0	4.88	4.44
1 3/4	CX01-0041	169.0	CX01-0056	150.0	CX01-0074	153.0	CX01-0649	136.0	5.67	5.15
1 7/8	CX01-0042	192.0	CX01-0057	171.0	CX01-0075	174.0	CX01-0650	155.0	6.50	5.91
2	CX01-0043	217.0	CX01-0058	194.0	CX01-0076	198.0	CX01-0651	176.0	7.39	6.72
2 1/8		—		—	CX01-0628	221.0	CX01-0652	197.0	8.35	7.59
2 1/4		—		—	CX01-0629	247.0	CX01-0653	220.0	9.36	8.51
2 3/8		—		—	CX01-0630	274.0	CX01-0654	244.0	10.4	9.48
2 1/2		—		—	CX01-0631	302.0	CX01-0655	269.0	11.6	10.5
2 5/8		—		—	CX01-0632	331.0		—	12.8	11.6
2 3/4		—		—	CX01-0633	361.0		—	14.0	12.7

**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.

WARNING: Any warranties, expressed or implied, concerning the use of this product apply only to the nominal strength of new, unused wire rope. All equipment using this product must be properly used and maintained. Wire rope must be properly stored, handled, used and maintained. Most importantly, wire rope must be regularly inspected during use. Damage, abuse or improper maintenance can cause rope failure. Consult the AISI Wire Rope Users Manual, ASME or ANSI Standards, before usage. Wire rope removal criteria are based on the use of steel sheaves. If synthetic sheaves are used, consult the sheave equipment manufacturer. **WARNING!**

GENERAL PURPOSE WIRE ROPES

6 x 37 Classification



6 x 31 Warrington Seale

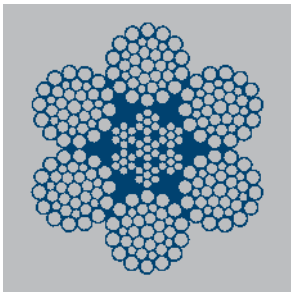
Characteristics

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

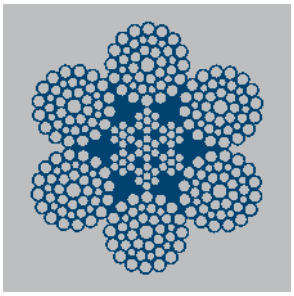
Characteristics

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

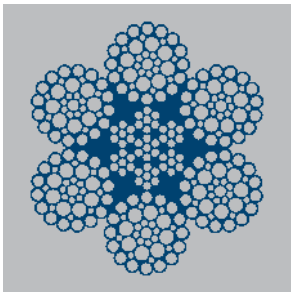
Characteristics

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

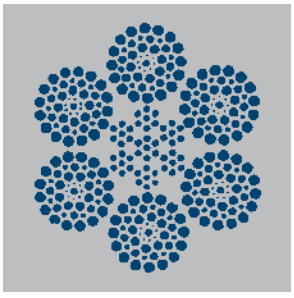


6 x 41 Seale Filler Wire

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, shovel and dragline hoist ropes

IWRC shown; fiber core available

GENERAL PURPOSE WIRE ROPES

6 x 37 Classification

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. 6 x 37 classification ropes contain 6 strands with 27 through 49 wires, no more than 18 of which are outside wires.

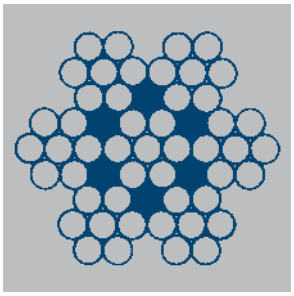
6 x 37 Classification Rope										
Diameter, in.	Nominal Strength,* Tons (Bright or Drawn Galvanized)†								Approximate Wt./Ft., lb.	
	EEIP				EIP				IWRC	Fiber Core
	CERTEX Cat. Ref. No.	IWRC	CERTEX Cat. Ref. No.	Fiber Core	CERTEX Cat. Ref. No.	IWRC	CERTEX Cat. Ref. No.	Fiber Core		
1/4		—		—	CX01-0113	3.40	CX01-0155	3.02	0.116	0.105
5/16		—		—	CX01-0114	5.27	CX01-0156	4.69	0.180	0.164
3/8		—		—	CX01-0115	7.55	CX01-0157	6.71	0.260	0.236
7/16		—		—	CX01-0116	10.2	CX01-0158	9.09	0.35	0.32
1/2	CX01-0077	14.6	CX01-0095	12.9	CX01-0117	13.3	CX01-0159	11.8	0.46	0.42
9/16	CX01-0078	18.5	CX01-0096	16.2	CX01-0118	16.8	CX01-0160	14.9	0.59	0.53
5/8	CX01-0079	22.7	CX01-0097	20.0	CX01-0119	20.6	CX01-0656	18.3	0.72	0.66
3/4	CX01-0080	32.4	CX01-0098	28.6	CX01-0120	29.4	CX01-0657	26.2	1.04	0.95
7/8	CX01-0081	43.8	CX01-0099	39.0	CX01-0121	39.8	CX01-0658	35.4	1.42	1.29
1	CX01-0082	56.9	CX01-0100	50.6	CX01-0122	51.7	CX01-0659	46.0	1.85	1.68
1 1/8	CX01-0083	71.5	CX01-0101	63.6	CX01-0123	65.0	CX01-0660	57.9	2.34	2.13
1 1/4	CX01-0084	87.9	CX01-0102	78.2	CX01-0124	79.9	CX01-0661	71.0	2.89	2.63
1 3/8	CX01-0085	106.0	CX01-0103	94.0	CX01-0125	96.0	CX01-0662	85.4	3.50	3.18
1 1/2	CX01-0086	125.0	CX01-0104	111.0	CX01-0126	114.0	CX01-0663	101.0	4.16	3.78
1 5/8	CX01-0087	146.0	CX01-0105	129.0	CX01-0127	132.0	CX01-0664	118.0	4.88	4.44
1 3/4	CX01-0088	169.0	CX01-0106	150.0	CX01-0128	153.0	CX01-0665	136.0	5.67	5.15
1 7/8	CX01-0089	192.0	CX01-0107	171.0	CX01-0129	174.0	CX01-0666	155.0	6.50	5.91
2	CX01-0090	217.0	CX01-0108	194.0	CX01-0130	198.0	CX01-0667	176.0	7.39	6.72
2 1/8	CX01-0091	243.0	CX01-0109	215.0	CX01-0131	221.0	CX01-0668	197.0	8.35	7.59
2 1/4	CX01-0092	272.0	CX01-0110	240.0	CX01-0132	247.0	CX01-0669	220.0	9.36	8.51
2 3/8	CX01-0093	301.0	CX01-0111	266.0	CX01-0133	274.0	CX01-0670	244.0	10.4	9.48
2 1/2	CX01-0094	332.0	CX01-0112	293.0	CX01-0134	302.0	CX01-0671	269.0	11.6	10.5
2 5/8		—		—	CX01-0135	331.0		—	12.8	11.6
2 3/4		—		—	CX01-0136	361.0		—	14.0	12.7
2 7/8		—		—	CX01-0137	392.0		—	15.3	13.9
3		—		—	CX01-0138	425.0		—	16.6	15.1
3 1/8		—		—	CX01-0139	458.0		—	18.0	16.4
3 1/4		—		—	CX01-0140	492.0		—	19.5	17.7
3 3/8		—		—	CX01-0141	529.0		—	21.0	19.1
3 1/2		—		—	CX01-0142	564.0		—	22.7	20.6
3 5/8		—		—	CX01-0143	602.0		—	24.3	—
3 3/4		—		—	CX01-0144	641.0		—	26.0	—
3 7/8		—		—	CX01-0145	680.0		—	27.7	—
4		—		—	CX01-0146	720.0		—	29.6	—
4 1/8		—		—	CX01-0147	761.0		—	31.4	—
4 1/4		—		—	CX01-0148	803.0		—	33.4	—
4 3/8		—		—	CX01-0149	846.0		—	35.4	—
4 1/2		—		—	CX01-0150	889.0		—	37.4	—
4 5/8		—		—	CX01-0151	934.0		—	39.5	—
4 3/4		—		—	CX01-0152	979.0		—	41.7	—
4 7/8		—		—	CX01-0153	1024.0		—	43.9	—
5		—		—	CX01-0154	1070.0		—	46.2	—

**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.

WARNING: Any warranties, expressed or implied, concerning the use of this product apply only to the nominal strength of new, unused wire rope. All equipment using this product must be properly used and maintained. Wire rope must be properly stored, handled, used and maintained. Most importantly, wire rope must be regularly inspected during use. Damage, abuse or improper maintenance can cause rope failure. Consult the AISI Wire Rope Users Manual, ASME or ANSI Standards, before usage. Wire rope removal criteria are based on the use of steel sheaves. If synthetic sheaves are used, consult the sheave equipment manufacturer. **WARNING!**

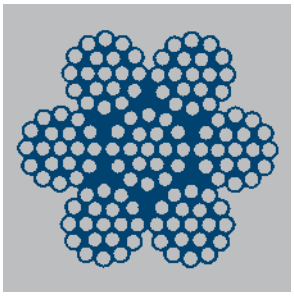
GENERAL PURPOSE WIRE ROPES

Galvanized Cable



7 x 7 Galvanized Cable

CERTEX Cat. Ref. No.	Size	Approx. Weight per 1000 ft.	Breaking Strength Pounds*
CX01-0161	1/16"	7.5 lbs.	480
CX01-0162	3/32"	16	920
CX01-0163	1/8"	28	1,700
CX01-0164	5/32"	43	2,600
CX01-0165	3/16"	62	3,700
CX01-0166	1/4"	106	6,100



7 x 19 Galvanized Cable

CERTEX Cat. Ref. No.	Size	Approx. Weight per 1000 ft.	Breaking Strength Pounds*
CX01-0167	3/32"	17.4 lbs.	1,000
CX01-0168	1/8"	29	2,000
CX01-0169	5/32"	45	2,800
CX01-0170	3/16"	65	4,200
CX01-0171	7/32"	86	5,600
CX01-0172	1/4"	110	7,000
CX01-0173	5/16"	173	9,800
CX01-0174	3/8"	243	14,400

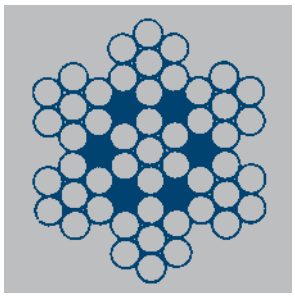
NOT FOR AIRCRAFT USE.
("Aircraft Cable" has become an accepted industry term for small diameter 7 x 7 and 7 x 19 construction wire rope intended for industrial and marine application.)

Read important warnings and information preceding wire rope section.

WARNING: Any warranties, expressed or implied, concerning the use of this product apply only to the nominal strength of new, unused wire rope. All equipment using this product must be properly used and maintained. Wire rope must be properly stored, handled, used and maintained. Most importantly, wire rope must be regularly inspected during use. Damage, abuse or improper maintenance can cause rope failure. Consult the AISI Wire Rope Users Manual, ASME or ANSI Standards, before usage. Wire rope removal criteria are based on the use of steel sheaves. If synthetic sheaves are used, consult the sheave equipment manufacturer. **WARNING!**

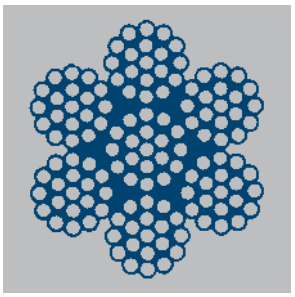
GENERAL PURPOSE WIRE ROPES

Stainless Steel Cable



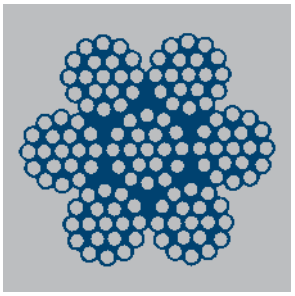
7 x 7 Stainless Steel Cable, Type 304

CERTEX Cat. Ref. No.	Size	Approx. Weight per 1000 ft. Pounds	Breaking Strength Pounds*
CX01-0175	1/16"**	7.5 lbs.	480
CX01-0176	3/32"**	16.0	920
CX01-0177	1/8"	28.0	1,760



7 x 19 Stainless Steel Cable, Type 304

CERTEX Cat. Ref. No.	Size	Approx. Weight per 1000 ft. Pounds	Breaking Strength Pounds*
CX01-0178	3/32"**	17	920
CX01-0179	1/8"**	29	1,760
CX01-0180	5/32"**	45	2,400
CX01-0181	3/16"**	65	3,700
CX01-0182	1/4"**	110	6,400
CX01-0183	5/16"**	173	9,000
CX01-0184	3/8"**	243	12,000



7 x 19 Stainless Steel Cable, Type 316

CERTEX Cat. Ref. No.	Size	Approx. Weight per 1000 ft. Pounds	Breaking Strength Pounds*
CX01-0185	1/8"	29	1,670
CX01-0186	3/16"	65	3,565
CX01-0187	1/4"	110	5,875
CX01-0188	5/16"	173	8,825
CX01-0189	3/8"	243	11,760

**Listed for comparison only. Actual operating loads may vary, but should never exceed 20% of catalog Breaking Strength.*
***According to MIL-W-83420D, with exceptions. Meeting Federal Specification RR-W-410D.*

NOT FOR AIRCRAFT USE.

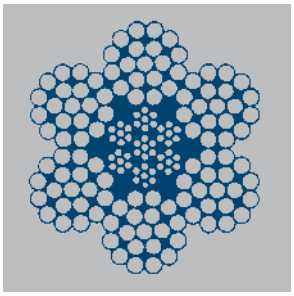
("Aircraft Cable" has become an accepted industry term for small diameter 7x7 and 7x19 construction wire rope intended for industrial and marine application.)

Read important warnings and information preceding wire rope section.

WARNING: Any warranties, expressed or implied, concerning the use of this product apply only to the nominal strength of new, unused wire rope. All equipment using this product must be properly used and maintained. Wire rope must be properly stored, handled, used and maintained. Most importantly, wire rope must be regularly inspected during use. Damage, abuse or improper maintenance can cause rope failure. Consult the AISI Wire Rope Users Manual, ASME or ANSI Standards, before usage. Wire rope removal criteria are based on the use of steel sheaves. If synthetic sheaves are used, consult the sheave equipment manufacturer. **WARNING!**

GENERAL PURPOSE WIRE ROPES

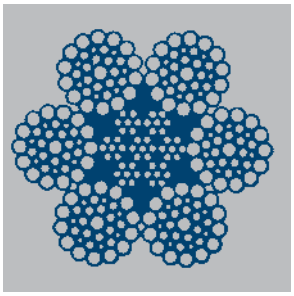
Stainless Steel Cable



6 x 19 (1 + 6 + 12) with IWRC

6 x 19 Stainless Steel Wire Rope, Type 304**

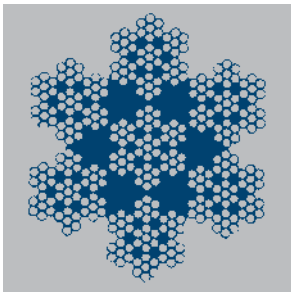
CERTEX Cat. Ref. No.	Diameter Inches	Approx. Weight per Foot, Pounds	Breaking Strength, Pounds*
CX01-0190	7/16	.35	16,300
CX01-0191	1/2	.46	22,800
CX01-0192	9/16	.59	28,500
CX01-0193	5/8	.72	35,000
CX01-0194	3/4	1.04	49,600



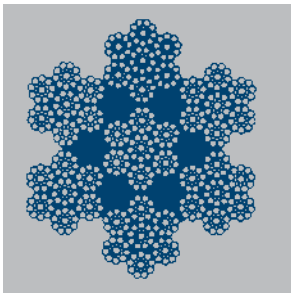
6 x 36 Warrington Seale with IWRC

6 x 36 Stainless Steel Wire Rope, Type 304**

CERTEX Cat. Ref. No.	Diameter Inches	Approx. Weight per Foot, Pounds	Breaking Strength, Pounds*
CX01-0195	3/8	.24	12,000
CX01-0196	7/16	.35	16,300
CX01-0197	1/2	.46	22,800
CX01-0198	9/16	.59	28,500
CX01-0199	5/8	.72	35,000
CX01-0200	3/4	1.04	49,600
CX01-0201	7/8	1.42	66,500
CX01-0202	1	1.85	85,400



7 x 7 x 7 Cable-Laid



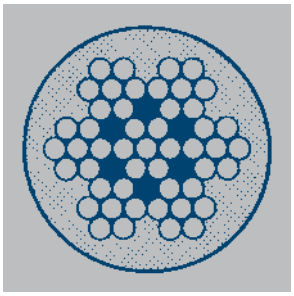
7 x 7 x 19 Cable-Laid

Cable-Laid Wire Rope** Galvanized, preformed.

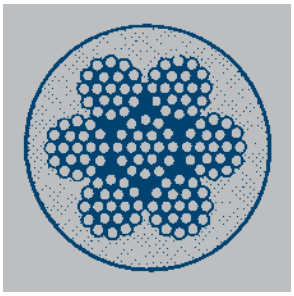
CERTEX Cat. Ref. No.	Diameter Inches	Construction	Approx. Weight per Foot, Pounds	Breaking Strength, tons*
CX01-0203	3/8	7 x 7 x 7	.21	5.7
CX01-0204	1/2	7 x 7 x 7	.37	9.75
CX01-0205	5/8	7 x 7 x 7	.58	14.6
CX01-0206	3/4	7 x 7 x 19	.88	21.4
CX01-0207	7/8	7 x 7 x 19	1.19	28.4
CX01-0208	1	7 x 7 x 19	1.56	36.2
CX01-0209	1 1/8	7 x 7 x 19	1.94	44.7
CX01-0210	1 1/4	7 x 7 x 19	2.39	53.7

**Listed for comparison only. Actual operating loads may vary, but should never exceed 20% of catalog Breaking Strength.*
***Read important warnings and information preceding wire rope section.*

Vinyl Coated Cable



7 x 7

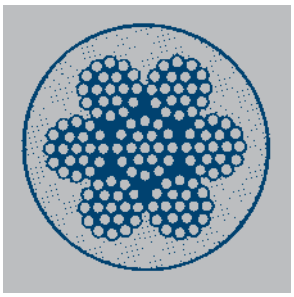


7 x 19

Clear Vinyl Coated Galvanized Cable

CERTEX Cat. Ref. No.	Cable Diameter	Coated to	Approx. Weight per 1000 ft. Pounds	Breaking Strength Pounds*	Construction
CX01-0211	1/16"**	1/8"	11.8	480	7 x 7
CX01-0212	3/32"**	1/8"	18.5	920	7 x 7
CX01-0213	3/32"**	3/16"	25.8	920	7 x 7
CX01-0214	1/8"	3/16"	35.2	1,700	7 x 7
CX01-0215	1/8"**	3/16"	36.2	2,000	7 x 19
CX01-0216	3/16"**	1/4"	77.5	4,200	7 x 19
CX01-0217	1/4"**	5/16"	123.0	7,000	7 x 19
CX01-021	5/16"**	3/8"	197.0	9,800	7 x 19

Also available on special order: nylon and vinyl in various colors.
Approx. 3 weeks delivery.
** Listed for comparison only. Actual operating loads may vary, but should never exceed 20% of catalog Breaking Strength.*
*** Uncoated cable according to MIL-W-83420D, with exceptions.*
Uncoated cable meets Federal Specification RR-W-410D.



7 x 19 Clear Vinyl Coated Stainless Cable, Type 304

CERTEX Cat. Ref. No.	Cable Diameter	Coated to	Approx. Weight per 1000 ft. Pounds	Breaking Strength Pounds*	Construction
CX01-0219	1/8"**	3/16”	36.2	1,760	7 x 19
CX01-0220	3/16"**	1/4”	77.5	3,700	7 x 19
CX01-0221	1/4"**	5/16”	123.0	6,400	7 x 19
CX01-0222	5/16"**	3/8”	197.0	9,000	7 x 19
CX01-0223	3/8"**	7/16”	270.0	12,000	7 x 19

Also available on special order: nylon and vinyl in various colors.
Approx. 3 weeks delivery.
* Listed for comparison only. Actual operating loads may vary, but should never exceed 20% of catalog Breaking Strength.
** Uncoated cable according to MIL-W-83420D, with exceptions.
Uncoated cable meets Federal Specification RR-W-410D.

NOT FOR AIRCRAFT USE.

(“Aircraft Cable” has become an accepted industry term for small diameter 7 x 7 and 7 x 19 construction wire rope intended for industrial and marine application.)

When using wire rope clips with plastic coated cable, match clip size to uncoated cable diameter (3/16" cable coated to 1/4" takes 3/16" clip.) Strip plastic coating off cable where clips will be positioned for full holding power.

Read important warnings and information preceding wire rope section.

ROTATION RESISTANT WIRE ROPES

The accepted definition of rotation resistant rope as stated in the Wire Rope Users Manual is:

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

While this properly defines the ropes, it does not tell the complete story about a commonly misunderstood and often misused product. Over the years, this type of rope has been known by various names such as Non-Rotating and Spin-Resistant. Several years ago, in order to more accurately describe the ropes and avoid confusion, they were categorized as Rotation Resistant Ropes. Bridon American produces and markets three different types of Rotation Resistant Ropes that can be grouped as follows:

Standard Rotation Resistant Ropes

19 X 7
18 X 7 FC
8 X 19 IWRC

Special Rotation Resistant Ropes

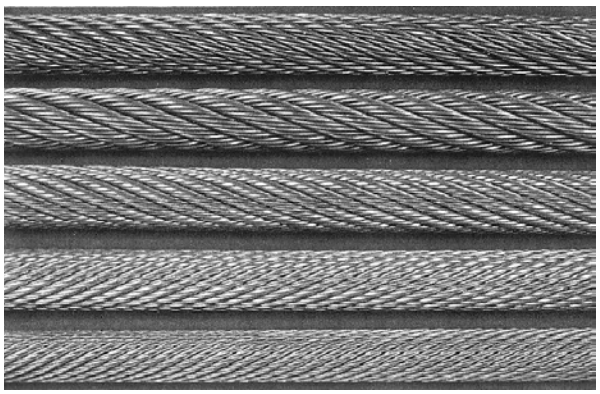
Endurance Dyform® – 18

Multiple Strand Rotation Resistant Ropes

Endurance Dyform® – 34LR
Endurance 35LS

All these ropes have specific operating and performance characteristics and some have limitations. An overview of certain operating characteristics shows the following:

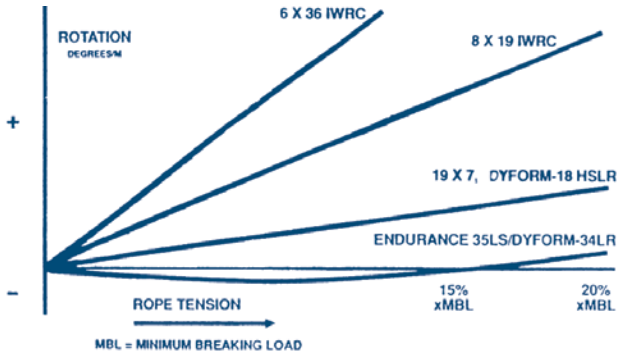
	19 x 7 18 x 7 FC	8 x 19 IWRC	DYF-18	34LR 35LS
Multiple Part Reeving	No	Yes	Yes	Yes
Single Part Reeving	Yes	Yes	Yes	Yes
Swivels	No	No	No	Yes
Strength	Low	Low	High	Highest
Preformed	Yes	Yes	Partially	No
Multiple Layer Winding	Yes	Yes	Yes	Yes
Prevention of Block Spinning	N/A	Good	Much Better	Best



A 19 x 7
B 8 x 19 IWRC
C Dyform-18
D Dyform-34LR
E Endurance 35LS

ROTATION RESISTANT WIRE ROPES

Diagramatic Illustration of Rotation Various Rope Constructions



Standard Applications

- Mobile Cranes and Overhead Hoists 19 x 7, 18 x 7 FC, 8 x 19 IWRC
- Mobile Cranes and Overhead Hoists Dyform-18
- Tower Cranes and various hoisting applications Dyform-34LR and Endurance 35LS

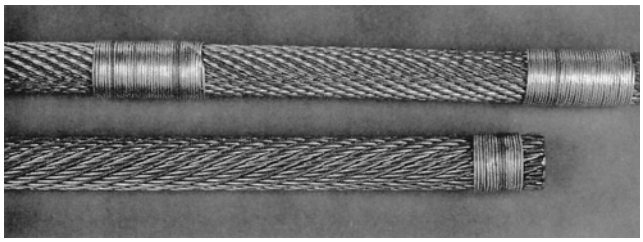
All Rotation Resistant Ropes can be used in a variety of other applications, but the specific application and the operating requirements should be carefully reviewed by BAC Technical Services or a qualified person before a recommendation can be made.

Seizing and Cutting

Because Rotation Resistant Ropes can be difficult to properly identify by sight, it is recommended that all Rotation Resistant Ropes be tightly seized with wire, strand or tape, or welded before cutting. It is important that all Rotation Resistant Ropes be prevented from unlaying when cut regardless of construction. General guidelines for seizing and welding are shown in the detail below. Endurance 35LS and Dyform-34LR should have welded ends and not seized ends.

Preformed/Non-Preformed

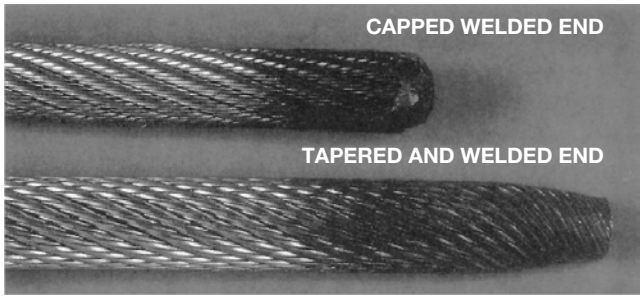
Rotation Resistant Ropes are special ropes and are produced with special manufacturing techniques to meet all of the required operating parameters of the ropes. To prevent confusion as to which are preformed, partially preformed and non-preformed. Bridon American attaches a warning tag on all Rotation Resistant Ropes to indicate that they should always be properly seized when cut.



NOTE: Two seizings are recommended for non-preformed rope and one seizing for preformed rope. Each seizing should be at least one rope diameter in length.

Welded Ends

A welded rope end can facilitate the installation of a Rotation Resistant Rope in a wedge socket. A welded rope end combined with a tail of less than 20 rope diameters can cause rope distortion. If the proper tail length is used, a welded end is acceptable.



Handling Installation

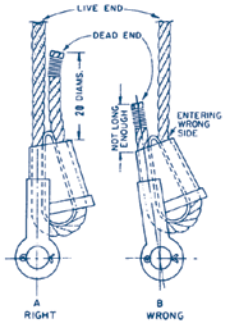
Rotation Resistant Ropes must have properly seized, or welded ends. They must be installed without inducing twist or turn. They must not be kinked, and they must have the proper tail length at the wedge socket.

Wedge Sockets

All Rotation Resistant Ropes can be used with standard wedge sockets. Certain precautions must be taken. All Rotation Resistant Ropes should be tightly seized with wire, strand or tape, or welded to prevent loss of rope lay at the dead end. Loss of rope lay will change the operating characteristics of the ropes and can cause high strands and rope distortion.

The dead end should be a minimum length of 20 rope diameters for all Rotation Resistant Ropes. A wire rope clip may be attached to the dead end.

ROTATION RESISTANT WIRE ROPES



Swivels

BAC's recommendation is that 19 x 7, 18 x 7 FC,8 x 19 IWRC, and Dyform-18 should not be dead ended into a swivel. The multiple strand Rotation Resistant Ropes such as Dyform-34LR and Endurance 35LS may be used with a swivel in any application.

The reason for this recommendation is that the standard Rotation Resistant Ropes and the Special Rotation Resistant Ropes will rotate under load.

Excessive rotation will cause imbalance and reduction in strength. Under a shock load or overload condition, the strength of these ropes can be reduced as much as 50%.

BAC does recognize that there are certain applications or operating requirements where a swivel must be used with Rotation Resistant Ropes. In these cases, it is mandatory that the design factor be strictly followed, the ropes are not shock loaded, and the ropes are frequently inspected by a qualified person. BAC recommends that each application requiring the use of a swivel with Standard or Special Rotation Resistant Ropes be reviewed and approved by a qualified person.

There has been some confusion about swivels attached between the rope and the dead end attachment point and swivels below the traveling block (between the block and the load). For the purpose of the previous discussion, we are referring to the swivel attachment between the rope and the dead end attachment point. Most swivels below the traveling block are not antifriction ball bearing swivels.

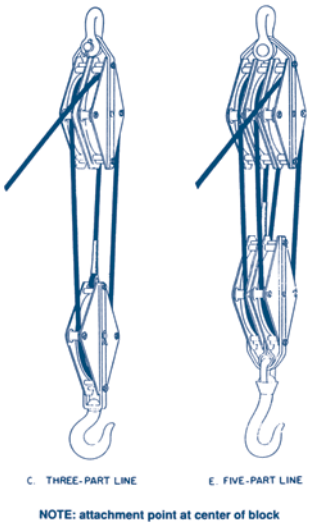
Multiple Part Reeving

19 x 7 and 18 x 7 FC ropes are not recommended for multiple part reeving. These ropes do not perform well and tend to become imbalanced when used in this manner. The 8 x 19 IWRC ropes, Dyform-18, Dyform-34LR, and Endurance 35LS are more stable constructions and can be used in multiple part reeving.

Single Part Hoisting

All Rotation Resistant Ropes can be used in single part hoisting. However, the limitations of single part hoisting must be understood. Rotation Resistant Ropes will develop torque when a load is applied and rotation of the load can occur. The amount of rotation depends on many factors.

If the loads being handled under all operating conditions are within the recommended design factors, the amount of rotation should not cause problems. If the rope is shock loaded or loaded beyond the recommended design factor,rotation of the rope will be a problem. As stated previously, when Rotation Resistant Ropes rotate, the strength of the rope is reduced. If the rotation is severe enough, the rope can fail or rapidly develop broken wires and wear in the inner rope where it can be difficult to detect.

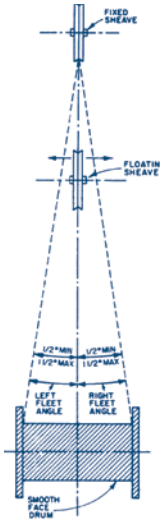


Odd Part Reeving

Odd part reeving such as 3, 5 or 7 part can cause problems if the traveling block is not properly aligned. While a greater number of parts reeved in an even number will require slower hoisting speeds, it can prevent problems. If odd part reeving is necessary, the dead end at the traveling block should be attached to the center of the block rather than at the side of the block. (see below).An odd part reeving system can cause the traveling block to be suspended and hang at an angle. This misalignment will induce twist into the rope during operation by the rope climbing the flange or rolling into the sheaves of the traveling block during hoisting.

Fleet Angles

Because Rotation Resistant Ropes develop less torque under load than a standard 6 strand rope, there can be a problem with rope pileup and poor spooling unless a proper fleet angle is maintained. The fleet angle becomes even more important with the very low torque ropes such as Dyform-34LR and Endurance 35LS. A fleet angle of 1/2° to 1-1/2°is recommended for Rotation Resistant Ropes.



ROTATION RESISTANT WIRE ROPES

Cabling Graph

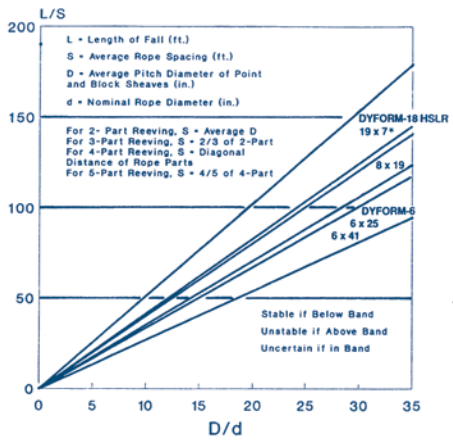
Field research jointly conducted by the Wire Rope Technical Board and the Power Crane and Shovel Association has shown that cabling of the rope parts in a multiple part reeved hoisting arrangement is controlled by several factors. The following calculations and graphs can be used to determine when and if cabling will occur on multiple part reeved hoisting arrangements.

The graph illustrates two dimensional ratios. They are:

1. L/S = Length of fall per unit rope spacing
2. D/d = Average pitch diameter of traveling and crown block sheave per unit rope diameter.

Various constructions of rope shown on the graph indicate the limited conditions for torsional stability with the angular displacement of the hoist block to a maximum of 90 degrees. When the operating conditions for a particular installation give a resultant above the appropriate band, then cabling of the falls will most likely occur. If the operating conditions give a resultant below any particular band, the cabling of the falls will most likely not occur. If the operating conditions for any particular installation fall within the band, cabling is unpredictable.

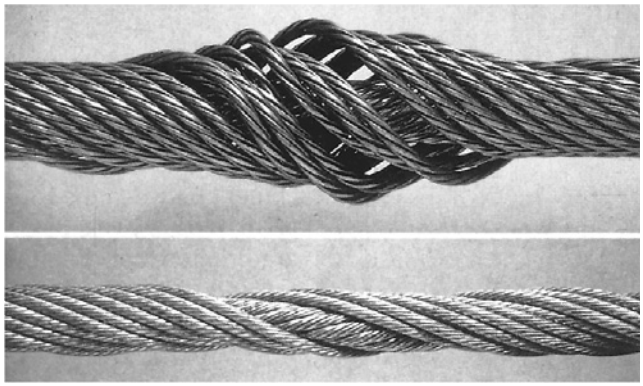
Wire Rope Cabling Bands



19 x 7 is shown in this band for information only.

Wire Rope Cabling Bands.

19 x 7 is not recommended for multiple part reeving.



Retirement Criteria

Recommended retirement criteria for all Rotation Resistant Ropes are 2 broken wires in 6 rope diameters or 4 broken wires in 30 rope diameters. (i.e. 6 rope diameters for a 1" diameter rope = 6").

Distortion of Rotation Resistant Ropes, as shown above, can be caused by shock load/sudden load release and/or induced torque and is the reason for immediate removal from service.

Recommended Minimum Sheave and Drum Diameters

The minimum D/d ratio allowed by applicable codes and standards covering equipment where Rotation Resistant Ropes are typically used is 18:1.

Recommended Minimum Design Factor

The minimum design factor allowed by applicable codes and standards covering equipment where Rotation Resistant Ropes are typically used is 5.

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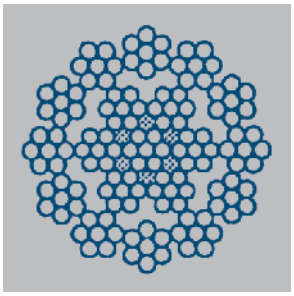
ROTATION RESISTANT WIRE ROPES

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.

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

- Standard constructions for single part and multipart lifting.
- Special wire rope constructions for increased service life in particularly demanding applications – DYFORM-18, 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.

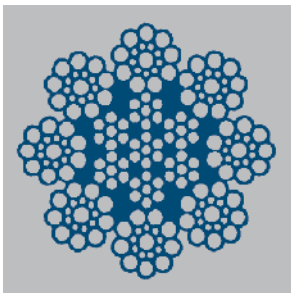
8 x 19 is a bright, IWRC, right regular lay wire rope. It may be ordered in diameters from 7/16" to 1 1/2"…EIP or IPS.

Dyform-18 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".

19 x 7 Rotation Resistant Rope				
CERTEX Cat. Ref. No.	Diam., in.	Nominal Strength,* Tons		Approx. Wt./Ft., lb.
		EIP	IPS	
CX01-0294	3/16	1.57	1.42	0.064
CX01-0295	1/4	2.77	2.51	0.113
CX01-0296	5/16	4.30	3.90	0.177
CX01-0293	3/8	6.15	5.59	0.25
CX01-0297	7/16	8.33	7.58	0.35
CX01-0298	1/2	10.8	9.85	0.45
CX01-0299	9/16	13.6	12.4	0.58
CX01-0300	5/8	16.8	15.3	0.71
CX01-0301	3/4	24.0	21.8	1.02
CX01-0302	7/8	32.5	29.5	1.39
CX01-0303	1	42.2	38.3	1.82
CX01-0304	1 1/8	53.1	48.2	2.30
CX01-0305	1 1/4	65.1	59.2	2.80
CX01-0306	1 3/8	78.4	71.3	3.43
CX01-0307	1 1/2	92.8	84.4	4.08

**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.

8 x 19 Rotation Resistant Ropes



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.

8 x 19 Rotation Resistant Rope				
CERTEX Cat. Ref. No.	Diam., in.	Nominal Strength,* Tons		Approx. Wt./Ft., lb.
		EIP	IPS	
CX01-0308	7/16	8.97	7.80	0.36
CX01-0309	1/2	11.7	10.2	0.47
CX01-0310	9/16	14.7	12.8	0.60
CX01-0311	5/8	18.1	15.7	0.73
CX01-0312	3/4	25.9	22.6	1.06
CX01-0313	7/8	35.0	30.5	1.44
CX01-0314	1	45.5	39.6	1.88
CX01-0315	1 1/8	57.3	49.8	2.39
CX01-0316	1 1/4	70.5	61.3	2.94
CX01-0317	1 3/8	84.9	73.8	3.56
CX01-0318	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.

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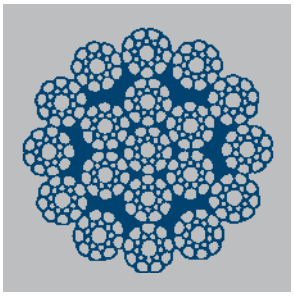
Dyform®-18 Rotation Resistant Ropes

BRIDON
a BRIDON · BEKAERT Ropes Group Brand



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 has up to 35% greater strength than conventional 19 x 7 EIP wire rope.

- High strength Rotation Resistant rope incorporating Dyform strands – confirmed by Bridon's "Powercheck" testing of a sample from each production length.
- Good resistance to rotations – confirmed by Bridon's unique "Twistcheck" type testing program.
- Superior bending fatigue life when compared with conventional multistrand ropes – confirmed by laboratory testing and extensive field experience.
- Excellent resistance to crushing and abrasion resulting from the overall compactness and robustness of the rope and the Dyform strands – recommended when multi-layer spooling is involved.
- Reduced elongation results from increased steel content and the Dyform process.
- Optional plastic coating of IWRC to further extend fatigue life, improve structural stability and resistance to corrosion.

Dyform®-18 Rotation Resistant Rope			
CERTEX Cat. Ref. No.	Diam., in.	Nominal Strength,* Tons	Approx. Wt./Ft., lb.
		Dyform®-18 HSLR	
CX01-0319	3/2	8.3	.27
CX01-0320	7/16	11.2	.37
CX01-0321	1/2	14.6	.51
CX01-0322	9/16	19.2	.64
CX01-0323	5/8	22.7	.79
CX01-0324	3/4	32.4	1.1
CX01-0325	7/8	43.8	1.5
CX01-0326	1	57.5	2.0
CX01-0327	1 1/8	71.5	2.5
CX01-0328	1 1/4	87.9	3.1

Other sizes available on request
**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.*

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LOW ROTATION WIRE ROPES

Dyform®-34LR and 34XL

BRIDON
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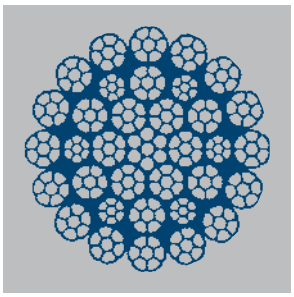

34 x 7

- Strongest of all ropes in the Rotation Resistant product range - confirmed by Bridon's "Powercheck" testing of a sample from each production length.
- Greatest resistance to rotation of all ropes in the Rotation Resistant product range – confirmed by Bridon's unique "Twistcheck" type testing program.
- Superior bending fatigue life when compared with conventional Rotation Resistant ropes – confirmed by laboratory testing and extensive field experience.
- Excellent resistance to crushing and abrasion resulting from the overall compactness and robustness of the rope and the Dyform strands – recommended when multi-layer spooling is involved.
- Reduced elongation results from increased steel content and the Dyform process.
- Optional plastic coating of IWRC to further extend fatigue life, improve structural stability and resistance to corrosion.

Dyform®-34Max

Diameter		Approx Mass		Minimum Breaking Force		
				Rope Grade		
				CERTEX Cat. Ref. No	34MAX	
In	mm	lb.	kg/ft		tons	kN
1		2.26	0.99		76.9	684.0
	26	2.39	1.09		78.3	705.0
	28	2.76	1.25		91.6	814.0
1 1/8		2.86	1.25		92.7	824.0
1 1/4	32	3.74	1.64		122.0	1085.0

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Dyform®-34LR and 34XL

BRIDON
a BRIDON · BEKAERT Ropes Group Brand

Dyform®-34LR

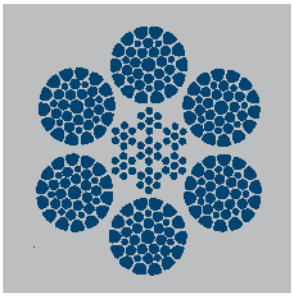
Diameter		Approx Mass		Minimum Breaking Force								
				Rope Grade								
				34L								
				CERTEX Cat. Ref. No	1960		CERTEX Cat. Ref. No	2160		CERTEX Cat. Ref. No	2160	
In	mm	lb.	kg/ft		tons	kN		tons	kN		tons	kN
1/2		0.54	0.24	CX01-0352	16.5	147.0	CX01-0375	18.0	160.0	–		
	13	0.57	0.26	CX01-0353	17.3	154.0	CX01-0376	18.7	166.0	–	–	–
	14	0.65	0.30	CX01-0354	20.1	179.0	CX01-0377	21.5	191.0	–	–	–
9/16		0.68	0.30	CX01-0355	20.8	185.0	CX01-0378	22.7	201.0	–	–	–
5/8	16	0.84	0.37	CX01-0357	26.1	232.0	CX01-0380	28.2	251.0	CX01-0674	30.6	272.0
	18	1.07	0.48	CX01-0359	33.5	298.0	CX01-0382	35.9	319.0	–	–	–
3/4	19	1.21	0.53	CX01-0360	37 3	29.0	CX01-0383	40.0	356.0	CX01-0677	42.9	382.0
	20	1.32	0.60	CX01-0361	41.6	370.0	CX01-0384	44.6	397.0	–	–	–
	22	1.61	0.73	CX01-0363	49.7	442.0	CX01-0386	54.2	482.0	CX01-0680	54.2	482.0
7/8		1.65	0.73	CX01-0364	50.4	448.0	CX01-0387	54.8	487.0	CX01-0681	54.8	487.0
	24	1.92	0.87	CX01-0366	59.3	528.0	CX01-0389	64.0	569.0	CX01-0683	64.0	569.0
	25	2.1	0.93	–	–	–	–	–	–	CX01-0684	69.7	620.0
1		2.15	0.95	CX01-0368	62.4	555.0	CX01-0391	70.0	638.0	CX01-0685	71.7	638.0
	26	2.28	1.04	CX01-0369	69.5	618.0	CX01-0392	74.0	658.0	CX01-0686	74.0	658.0
	28	2.63	1.19	CX01-0371	76	676.0	CX01-0394	82.6	735.0	CX01-0688	84.4	751.0
1 1/8		2.73	1.20	CX01-0372	79.5	689.0	CX01-0395	83.6	744.0	CX01-0689	86.9	773.0
	29	2.94	1.30	–	–	–	–	–	–	CX01-0690	93.2	829.0
	30	3.07	1.36	CX01-0373	92.2	820.0	CX01-0396	94.0	836.0	–	–	–
1 1/4	32	3.37	1.49	CX01-0374	98.2	874.0	CX01-0397	110.2	980.0	CX01-0691	110.2	980.0
1 1/2	38	4.92	2.17	–	–	–	–	–	–	CX01-0692	165.4	1472.0

WARNING: Any warranties, expressed or implied, concerning the use of this product apply only to the nominal strength of new, unused wire rope. All equipment using this product must be properly used and maintained. Wire rope must be properly stored, handled, used and maintained. Most importantly, wire rope must be regularly inspected during use. Damage, abuse or improper maintenance can cause rope failure. Consult the AISI Wire Rope Users Manual, ASME or ANSI Standards, before usage. Wire rope removal criteria are based on the use of steel sheaves. If synthetic sheaves are used, consult the sheave equipment manufacturer. **WARNING!**

HIGH PERFORMANCE WIRE ROPE

Dyform®– 6 Wire Rope

BRIDON
a BRIDON · BEKAERT Ropes Group Brand



Applications

Dyform-6 ropes should be used wherever increased strength or longer service life is desired. It is especially beneficial in those applications where the rope is subjected to heavy use. It has proven superior in such applications as boom hoist ropes, clam shell ropes, load hoist ropes, ore bridges and winch lines. Rugged Dyform-6 provides performance superior to standard six-strand ropes in all applications, especially those which are extremely abusive.

Characteristics

Greater Strength:
The superior strength of Dyform-6 is a direct result of the Dyform process which increases the amount of steel and reduces the amount of voids in the strands. The exceptional strength of Dyform-6 allows this product to meet or exceed the strength requirements of the Extra Extra Improved Plow Steel grade of wire rope. This increased strength provides greater lifting capacity while prolonging rope life.

Increased Flexibility:
The manufacturing process of Dyform-6 ropes provides increased flexibility which makes rope installation much easier. Lower internal stresses of Dyform-6 ropes offer longer bending fatigue life than standard six-strand ropes.

Improved Crush Resistance:
The compact strand construction of Dyform-6 ropes provides for much higher resistance to crushing. This improves the service life of the rope, especially in those applications which have multiple layers on the drum.

Superior Lubrication:
Dyform-6 ropes are thoroughly lubricated at stranding and closing with an exclusive Bridon American product, which provides excellent lubrication throughout the life of the rope. Each wire is completely coated at the time of manufacture to ensure that the friction between all wires is reduced to an absolute minimum.

Longer Rope Life:
The smooth periphery of Dyform-6 reduces bearing pressures which gives longer rope life and less downtime. The Dyform process increases the steel surface area by 100%. This increased surface area gives higher abrasion resistance, thus reducing rope and sheave wear.

Strength and Weight Table			
CERTEX Cat. Ref. No.	Diameter* Inches	Approx. Weight Pounds Per Foot	Nominal Strength Tons
CX01-0427	3/8	.31	8.8
CX01-0428	7/16	.39	11.9
CX01-0429	1/2	.49	15.3
CX01-0430	9/16	.63	19.3
CX01-0431	5/8	.78	22.7
CX01-0432	3/4	1.13	32.3
CX01-0433	7/8	1.54	43.8
CX01-0434	1	2.00	57.5
CX01-0435	1 1/8	2.54	71.5
CX01-0436	1 1/4	3.14	87.9
CX01-0437	1 3/8	3.80	106.0
CX01-0438	1 1/2	4.50	125.0

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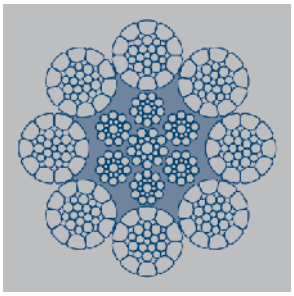
Endurance Dyform® 8/8PI

BRIDON
a BRIDON · BEKAERT Ropes Group Brand



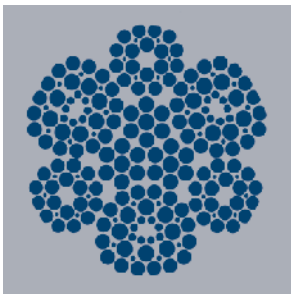
- High breaking force confirmed by Bridon's "Powercheck" testing of a sample from each production length.
- Superior bending fatigue life when compared with other conventional eight strand ropes - confirmed by laboratory testing and extensive field experience.
- Excellent resistance to crushing and abrasion resulting from the overall compactness and robustness of the rope and the Dyform strands - recommended when multi-layer spooling is involved.
- Reduced elongation results from increased steel content and the Dyform process.
- Optional plastic coating of IWRC to further extend fatigue life, improve structural stability and resistance to corrosion.

Lay Type		Lay Direction		Finish		Grade n/mm2
Ordinary	Langs	Right Hand	Left Hand	Bright	Galv	Dyform
●		●		●		●

Diameter		Approx Mass WSC		Minimum Breaking Force	
				Rope Grade	
				Dyform	
in	mm	lb./ft	kg/ft	tons	kN
3/8		0.32	0.14	9.7	86.3
	10	0.30	0.14	9.8	87.3
	11	0.38	0.17	11.8	105.0
7/16		0.40	0.18	12.4	110.4
	12	0.44	0.20	14.2	126.0
1/2		0.51	0.23	16.2	143.7
	13	0.52	0.23	16.5	147.0
	14	0.60	0.27	19.2	171.0
9/16		0.65	0.29	20.3	180.7
5/8		0.80	0.35	25.0	222.5
	16	0.78	0.35	25.2	224.0
	18	1.01	0.46	31.8	283.0
	19	1.12	0.51	35.5	316.0
3/4		1.16	0.51	36.0	320.4
	20	1.24	0.56	39.3	350.0
	22	1.49	0.68	47.7	424.0
7/8		1.58	0.70	48.3	429.4
	24	1.78	0.81	56.8	505.0
1		2.05	0.91	62.8	558.5
	26	2.12	0.96	66.5	592.0
	28	2.47	1.12	77.2	687.0
1 1/8		2.60	1.15	79.0	703.1
1 1/4		3.22	1.42	98.0	872.2
	32	3.26	1.48	100.8	897.0
1 3/8		3.90	1.72	117.0	1041.3
	36	4.07	1.85	127.9	1138.0
1 1/2		4.62	2.04	138.0	1228.2

HIGH PERFORMANCE WIRE ROPE

Constructex® Wire Rope



Applications

Constructex is recommended as a tubing line where longer service life is desired. Superior abrasion resistance makes Constructex the ideal wire rope for use on scrap-yard cranes. Constructex can be recommended with confidence wherever abusive applications exist.

Constructex can be recommended with confidence wherever abrasion and crush resistance are a major concern. In the conventional crane market, this rope has increased life on scrap cranes, clam shell holding and closing lines and boom hoist lines. Constructex also has a long history of superior performance as a tubing line in the well servicing industry. Most recently, Constructex has entered the rotary drill line industry and is outperforming standard 6x19s EIP IRWC RRL lines with up to twice the ton-miles and increased strength. For example, a rig using 1-3/8" Constructex will have a higher rope strength and achieve more ton-miles per foot than a rig using 1-1/2" 6x19s EIP IWRC RRL

Characteristics

Greater Strength:
The design of Constructex compacts more steel per diameter which provides for higher strength. This allows users to lift heavier loads while maintaining the same rope diameter.

Increased Crush Resistance:
The unique design of Constructex with its reduction of internal voids makes it better to withstand crushing. This makes Constructex the ideal rope for abusive applications.

Longer Rope Life:
The smooth outside surface of Constructex is a direct result of the swaging process. This smooth surface of greatly increased steel area enhances resistance to damage from abrasion.

Strength and Weight Table			
CERTEX Cat. Ref. No.	Diameter* Inches	Approx. Weight Pounds Per Foot	Nominal Strength Tons
CX01-0439	5/8	0.86	25.5
CX01-0440	3/4	1.1	36.5
CX01-0441	7/8	1.5	48.5
CX01-0442	1	2.0	62.5
CX01-0443	1 1/8	2.6	79.5
CX01-0444	1 1/4	3.2	97.6
CX01-0445	1 3/8	3.8	118.0
CX01-0446	1 1/2	4.6	139.0
CX01-0447	1 5/8	5.3	162.0
CX01-0448	1 3/4	6.2	185.0

**Other sizes available on request*

WARNING: Any warranties, expressed or implied, concerning the use of this product apply only to the nominal strength of new, unused wire rope. All equipment using this product must be properly used and maintained. Wire rope must be properly stored, handled, used and maintained. Most importantly, wire rope must be regularly inspected during use. Damage, abuse or improper maintenance can cause rope failure. Consult the AISI Wire Rope Users Manual, ASME or ANSI Standards, before usage. Wire rope removal criteria are based on the use of steel sheaves. If synthetic sheaves are used, consult the sheave equipment manufacturer. **WARNING!**