2005

Hanes SUPPLY, INC.

RIGGERS HANDBOOK

75 CELEBRATING Years

A tremendous reference guide for every Rigger!

Specs for wire rope, chain and SLINGMAX™ slings
Fittings and accessories
General usage and safety guidelines

This Rigger's Handbook is dedicated to Theodore C. Hanes, the founder of Hanes Supply. Ted left us on August 11, 1997. We Know it is appropriate that the history of Hanes Supply should be told by Ted. His hard work, common sense and dedication enabled Hanes Supply to move forward into the next millennium.

"It all started when Tex McLaughlin taught me how to splice cable in order to obtain my Federal A and E Aircraft Mechanics License #8867 on May 1, 1930. After leaving American Airways August 20, 1936 to become a Professional Firefighter, I soon learned that splicing cable for local contractor friends like Herb Darling and Howard Stimm put extra bread on the table.

Soon we had to take operations into larger quarters at 23 Poplar Avenue. In 1962 we moved to the warehouse at 1294 Seneca Street, giving us the space for a larger Sling Shop and also the ability to be an Allied Products Supply House with more products and quicker, better service.

Our new 55,000 square feet warehouse at 55 James E. Casey Drive enables us to stock even more products to better service our customers. The increasing number of Hanes Supply customers in Central New York State convinced us to open our new Rochester Warehouse. Hanes Supply is committed to making the moves to give the best possible service to all of our customers.

On October 1, 1975 I retired as a Battalion Chief from the Buffalo Fire Department enabling me to devote more time to the company until my son Bill could take the wheel. Bill graduated in June 1980 as a Civil Engineer from the State University at Buffalo and is now President of Hanes Supply, Inc. Having been around watching Dad since he was 9 years old, he thoroughly knows the wire rope business. In association with his friends Dennis St. Germain and Jim Boyco, Bill and the Hanes Supply Crew have learned many modern improvements in sling productions.

Many thanks to our hard working staff led by our Operations Manager and son-in-law Dave Learn, Retired Office Manager Hermine Bruno, my other son Ted Hanes, II and my late wife Nellie C. Hanes who have all been very valuable assets to our business."

Ted Hanes, 1996

Ted had many other accomplishments including being a Buffalo Firefighter for 39 years, retiring as Battalion Chief in 1975. During WWII, Ted served in the Coast Guard Reserve. Ted was Commodore of the Buffalo Yacht Club in 1957 and Master of his Masonic Lodge in 1950.

Ted and Nellie had five children in the 1950's. When most couples would be thinking of retirement, they were busy providing the best home and education for their children.

Work was never a four letter word to Ted. Long days and nights of working at Hanes Marine and Cable and the Buffalo Fire Department were common. He spent countless hours making slings by walking around the rigger's vise. His strength and determination built Hanes Supply into what it is today. He also had the strength to pass the company to the next generation.

Your memory and leadership will never leave us. Special thanks to a great man who we are proud to have had as our father. God bless you.

Thank you,

Bill Hanes / Dave Learn / Ted Hanes II

Hanes SUPPLY, INC.
YOUR SLING AND RIGGING SPECIALIST

Table of Contents

HANES SUPPLY HAS COMPLETE TESTING FACILITIES for tension and cycling of wire rope, chain, nylon, high-performance fiber slings, and related items including spreader beams and other types of rigging gear.

Specifications: 225' clear test bed with complete length adjustment to suit any test item.

Capacity: 225 ton maximum pull test and 200 ton maximum break test. Now available up to 3 Million pounds.

Ram Stroke: 8' Ram

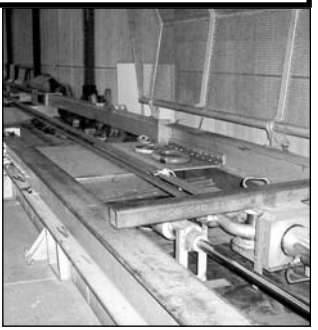
Gauges: Digital readout

Holding Load: Up to 225 tons can be held in tension for an indefinite period which can be predetermined by the customer.

Calibration: In accordance with ASTM E4-94 + / -1%, and complies to MIL-STD-45662A and traceable to the National Institute of Standards and Technology. Recalibrated each 12 months or as otherwise deemed necessary.

SC&RA
Specialized Carriers & Rigging Association

STAFDA



Hanes Supply Test Bed

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Hanes SUPPLY, INC.
YOUR SLING AND RIGGING SPECIALIST

Innovative Lifting Solutions

Hanes Supply specializes in lifting solutions for a wide variety of applications. As a manufacturer of Slingmax® slings we are proud to provide riggers with innovative products that increase productivity and safetyi The following product inventions provide benefits that make a rigger's work easier, safer or more cost effective.

TWIN-PATH® EXTRA SLINGS WITH COVERMAX AND K-SPEC™ CORE YARN
US Patent #4,850,629; CN #1,280,458

TPXC The best synthetic sling. Made with K-Spec™ high performance fibers and a bulked nylon outer cover (Covermax) that is very abrasion resistant. For vertical rated capacities up to 300,000 lbs. This sling features overload tell-tails, fiber optic inspection system, red inner cover, and are used worldwide in place of chain and wire rope slings for heavy lifts. They are also repairable. The Twin-Path® patented design provides the rigger with redundant protection in the event that one path is cut. These slings have 1% stretch at rated capacity and are made in matched lengths. If head room is critical, then these are the slings for the job. Conforms to ASME B30.9 Chapter six and US Navy NAVFAC P-307 Section 14. Developed by a team of professional riggers to overcome shortfalls found in single path roundslings. ***See page 7.***

TWIN-PATH® EXTRA SLINGS WITH K-SPEC™
US Patent #4,850,629; CN #1,280,458

TPX Same as the slings above, but they have polyester outer covers which are less abrasion resistant than the Covermax. Complete with overload tell-tails, fiber optic inspection system, red inner cover, orange outer cover, and are repairable. These slings have 1% stretch at rated capacity and are made in matched lengths. If you are interested in safety, ergonomics, increased productivity and saving money, then this is the product.
See page 7.

TWIN-PATH® POLYESTER SLINGS WITH COVERMAX
US Patent #4,850,629; CN #1,280,458

TPC slings are made in capacities up to 60,000 lbs. vertical. They have the abrasion resistant Covermax cover with a polyester inner cover over polyester fiber cores. Complete with overload tell-tails and are repairable. Like all Twin-Path® slings, they can be fitted with fiber optics for inspection. These slings have up to 3% stretch at rated capacity. ***See page 8.***

TWIN-PATH® POLYESTER SLINGS
US Patent #4,850,629; CN #1,280,458

TP slings are the same as the TPC slings except their outer covers are polyester and less abrasion resistant than Covermax. ***See page 8.***

TWIN-PATH® TWO LEG BRIDLES
US Patent #5,727,833 & 4,850,629

TL Simply the lightest and strongest synthetic bridles in the world today. Replaces existing chain and wire rope bridles. The Twin-Path® synthetic bridle with K-Spec™ core yarn is less than half the weight of any steel assembly and is the ergonomic bridle of the future, here today. The loop at the top goes on the crane hook and there is no heavy steel ring to deal with. If you need a four leg bridle, just use two Twin-Path® Two Leg bridles. Capacities to 200,000 lbs. ***See page 9.***

TWIN-PATH® EYE & EYE SYNTHETIC SLING
US Patent #5,727,833 & 4,850,629

EE This product is made to be an eye and eye sling only, with all of the Twin-Path® features. This sling is light, strong and less expensive than a round sling with a sleeve. It can be manufactured using either K-Spec™ core yarn or polyester. ***See page 10.***

Innovative Lifting Solutions

Hanes SUPPLY, INC.
YOUR SLING AND RIGGING SPECIALIST

TWIN-PATH® ADJUSTABLE BRIDLE SLING
US Patent #4,850,629 & #5,651,573

TPXA or TPA This tool is an aid to finding the center of gravity when lifting objects with uneven geometric proportions or off-center balance points. When the load is lifted, the ring moves over the COG to balance and level the object. The Twin-Path® may be permanently attached to the ring, or use a G-Link™ for the connection. ***See page 11.***

SPARKEATER® SYNTHETIC SLINGS
US Patent #4,850,629

SE For hot environments up to 300°F, the Sparkeater® lifts the load without marring the surface of the lifted piece. Excellent for stage rigging, this product offers protection from exposure to fire, heat, sparks and pyrotechnics. Made from Nomex® for the cover and Aramid high performance core yarns. Rated capacities of 2,000 lbs. to 30,000 lbs. Fire exposure testing was performed by London Scientific and the product was identified as being as good as wire rope or chain for use in off shore applications in the oil industry. ***See page 13.***

FIBER OPTIC INSPECTION OPTION
US Patent #5,651,572

FO All of the Twin-Path® slings have the Fiber Optic inspection system. The fiber optic cable will conduct light using natural, overhead or flashlight sources. The condition of the internal core yarn can be inspected by checking the continuity of the fiber optic cable. If heat, chemicals, crushing or cutting has occurred, the damage to the fiber optic cable will destroy its ability to transmit light from one end to the other. This gives the inspector a reason to remove the sling from service and send it for repair evaluation. ***See page 8.***

CORNERMAX™
US Patent #5,651,573 & Patents Pending

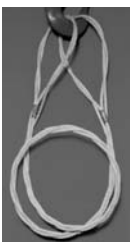
The Cornermax™ cut protection device prevents a sharp edge on the load from touching the sling. In fact, the sharp edge doesn't even touch the Cornermax™ protector! This protector will handle the most extreme circumstances lifting steel and concrete. ***See page 14.***

SYNTHETIC ARMOR WEAR PADS

For extra protection for synthetic, wire rope, and chain slings, we have available an assortment of materials that we incorporate in our Synthetic Armor Wear Pads. These are primarily for abrasion or wear protection but can be used for cut protection in many cases. Not only will these wear pads keep the load from damaging the slings, but they will also protect the load from being scratched by the slings. ***See page 14.***

G-LINK™ CONNECTORS
US Patent #5,651,573 & Patents Pending

This is the only universal coupler designed to fulfill all the needs of riggers in the field! You can use it on Twin-Path®, Web and Single Path Round Slings for attaching hooks, rings, two slings together, as a sliding choker connection, as an adjustable sling, or as a choke lock connection. No parts, bolts, nuts, cotters, pins, or anything to look for. The G-Link™ connector keeps hardware such as hooks or rings in the same plane as the sling. ***See page 15.***



TRI-FLEX® WIRE ROPE SLING
US Patent #4,043,581

This is a three-part wire rope sling developed for strength combined with greater flexibility. Replaces large diameter single-part wire rope slings which are awkward and stiff. Tri-Flex® Slings are manufactured in sizes from 1 ton to 150 ton capacity. Steel erectors, millwrights and riggers use Tri-Flex® slings for everything from steel erection and machinery moving to heavy lifts of 200 tons or more. These slings are made in matching lengths.
See page 24.

TRI-FLEX® WIRE ROPE
US Patent #4,043,581

Tri-Flex® Wire Rope is a three-part wire rope made in lengths up to 200' installed on winches for barges, tugs and car pullers. It wraps snugly around the winch hub because it has greater flexibility than standard wire rope. Order by specifying rated capacity or finished diameter, and required end attachment.

TRI-FLEX® SLING SYSTEM
US Patent #4,240,659
CN Patent #1,082,755
British Patent #2,029,796

This product is a combination of three Tri-Flex® Wire Rope slings wrapped together to form a nine-part finished body sling. After a heavy lift is done, the product can be taken apart to form three individual Tri-Flex® slings for smaller lifting work. There are twelve parts of wire rope in the loop for greater strength than traditional nine part wire rope slings. ***See page 26.***

GATOR-MAX®
US Patent #5,561,973
& Patents Pending

Tests have proven this sling to be the strongest Multi-Part wire rope sling when attached to small pins because it has twelve parts of wire rope in the loop in a parallel construction. It will develop its full strength on small pins with a D/d ratio of 1/1 where D is the pin and d is the sling body. (4/1 D/d when comparing the pin to the component parts.) The Gator-Max® sling was developed to meet conditions specified by the US Navy and the Wire Rope Technical Board Sling Manual. ***See page 27.***

GATOR-LAID®
WIRE ROPE SLING
US Patent #4,240,659

Identical to the Gator-Max® sling except it has metal sleeves for the splice connection. The ideal sling for big lifts but when a shorter sling is required. The Gator-Flex® and Gator-Laid® products were developed in conjunction with the off shore oil industry to provide the best heavy lift wire rope slings. ***See page 27.***

GATOR-FLEX®
WIRE ROPE SLING
US Patent #5,561,973

This sling has a nine-part body style but the eyes are crossed or interwoven so that no wrapping is necessary. This allows for visual inspection of the sling. Used for heavy lifts and offers the highest flexibility in a Multi-Part wire rope sling. ***See page 30.***

T & D ULTRA-FLEX
WIRE ROPE SLING
US Patent #5,561,973

Developed by a committee composed of utility company workers and members of the Slingmax® design team, this wire rope sling is an extremely flexible product with great applications for general rigging purposes in the utility industry. It makes a fantastic choker sling especially when lifting poles.
See page 30.

GATOR-FLEX® NINE PART GROMMETS
US Patent #5,561,973

Ultra flexible slings for short heavy lift connection. These slings can be made shorter than standard Multi-Part slings but maintain all of the advantages.
See page 32.

TWIN-FLEX®
WIRE ROPE SLINGS
US Patent #5,561,973

Another model of a grommet type sling which is formed into an eye and eye design. It consists of 18 body parts with a loop at each end. It is extremely flexible and is used where heavy lift, short slings are required.
See page 32.

CHAIN SLING SADDLE RING
US Patent #4,241,575;
CN Patent #1,086,510;
British Patent #2,029,370

This product gives a chain bridle length adjustment capabilities in each chain leg. It aids the rigger in placing the lifting point over the center of gravity so the load will lift in a level manner. Different length chains or chains with different attachments can be interchanged in the Saddle Ring for added utility. The Saddle Ring has found favor with millwrights for moving machinery in factories.
See page 46.

TWIN-PATH® SLINGS IN CONSTRUCTION

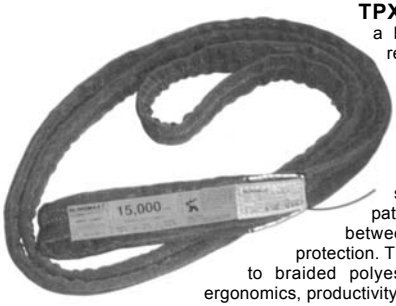
517 ton Bridge Retrofit

440 ton Gas Plant Vessel

80 ton Concrete Pilings

100 ton Airport Walkway Section

TWIN-PATH® EXTRA SLING WITH COVERMAX AND K-SPEC® CORE YARN



TPXC This is the world's first truly ergonomic sling. It has a bulked nylon outer cover for superior abrasion resistance. These are made in sizes up to 300,000 lbs. vertical rated capacity. Larger capacity slings are available on special order. Extra Heavy Duty Covermax is standard on 70,000 lb. vertical capacity and higher. These slings have overload tell-tails, inner red cover, and are used worldwide in place of wire rope slings for heavy lifts. They are about 10% of the weight of a steel sling. These products are repairable. The Twin-Path® patented design provides the rigger with two connections between the hook and the load for redundant back-up protection. These slings have 1% stretch at rated capacity compared to braided polyester round slings which can stretch up to 9%. If ergonomics, productivity and safety are important, then these slings are the only choice. This is the lightest and strongest sling on the market today with K-Spec®, the longest lasting load bearing core yarn, backed by independent testing. All slings have fiber optic internal inspection system.

TWIN-PATH® EXTRA COVERMAX SPECIFICATIONS

United States Patent #4,850,629	RATED CAPACITIES (LBS.) 5-1 D/F					Canadian Patent #1,280,458	
	CHOKER	VERTICAL	BASKET HITCHES				
TWIN-PATH® EXTRA COVERMAX STOCK NO.			0° 	60° 	45° 	APPROXIMATE WEIGHT (LBS. PER FT.) (BEARING-BEARING)	APPROXIMATE BODY WIDTH (IN.)
TPXC 1000	8,000	10,000	20,000	17,320	14,140	.31	3"
TPXC 1500	12,000	15,000	30,000	25,980	21,210	.40	3"
TPXC 2000	16,000	20,000	40,000	34,640	28,280	.55	3"
TPXC 2500	20,000	25,000	50,000	43,300	35,350	.65	4"
TPXC 3000	24,000	30,000	60,000	51,960	42,420	.80	4"
TPXC 4000	32,000	40,000	80,000	69,280	56,560	1.12	5"
TPXC 5000	40,000	50,000	100,000	86,139	70,700	1.50	5"
TPXC 6000	48,000	60,000	120,000	103,920	84,840	1.60	6"
TPXC 7000	56,000	70,000	140,000	121,240	98,980	1.68	6"
TPXC 8500	68,000	85,000	170,000	147,220	120,190	1.85	6"
TPXC 10000	80,000	100,000	200,000	173,200	141,400	2.20	6"
TPXC 12500	100,000	125,000	250,000	216,500	176,750	3.00	8"
TPXC 15000	120,000	150,000	300,000	259,800	212,100	3.36	8"
TPXC 17500	140,000	175,000	350,000	303,100	247,450	4.00	10"
TPXC 20000	160,000	200,000	400,000	346,400	282,800	4.37	10"
TPXC 25000	200,000	250,000	500,000	433,000	353,500	5.50	11"
TPXC 27500	220,000	275,000	550,000	476,300	388,850	6.90	11"
TPXC 30000	240,000	300,000	600,000	519,600	424,200	7.50	12"

PLEASE NOTE: Capacities shown include both paths and are for one complete sling. Ratings based on straight pin diameter one-half the sling width.

DO NOT EXCEED RATED CAPACITY

⚠ WARNING Can fail if damaged, misused or overloaded. Inspect before use. Use only if trained. Observe rated capacity. Avoid sharp edges and exposure to acid, alkali, sunlight and temperature over 180°F. DEATH or INJURY can occur from improper use or maintenance.

Twin-Path® Covermax Slings (Polyester)
Fiber Optic Inspection (All Slings)

Hanes SUPPLY, INC.
YOUR SLING AND RIGGING SPECIALIST

TWIN-PATH® POLYESTER SLINGS WITH COVERMAX SPECIFICATIONS

United States Patent #4,850,629	Rated Capacities (lbs.) 5-1 D/F					Canadian Patent #1,280,458	
	CHOKER	VERTICAL	BASKET HITCHES			APPROXIMATE WEIGHT (LBS. PER FT.) (BEARING-BEARING)	APPROXIMATE BODY WIDTH (IN.)
TWIN-PATH® EXTRA COVERMAX STOCK NO.			0° 	60° 	45° 		
TPC 200	1,600	2,000	4,000	3,464	2,828	.28	2"
TPC 300	2,400	3,000	6,000	5,196	4,242	.30	2"
TPC 450	3,600	4,500	9,000	7,794	6,383	.45	2"
TPC 600	4,800	6,000	12,000	10,392	8,484	.48	3"
TPC 750	6,000	7,500	15,000	12,990	10,605	.65	3"
TPC 900	7,200	9,000	18,000	15,588	12,726	.70	3"
TPC 1200	9,600	12,000	24,000	20,784	16,968	.90	4"
TPC 1400	11,200	14,000	28,000	24,248	19,798	.95	4"
TPC 1700	13,600	17,000	34,000	29,440	24,038	1.20	4"
TPC 2200	17,800	22,000	44,000	38,104	31,108	1.40	5"
TPC 2600	20,800	26,000	52,000	45,032	36,784	1.70	5"
TPC 3200	25,600	32,000	64,000	55,424	45,248	1.90	5"
TPC 5000	40,000	50,000	100,000	86,600	70,700	2.70	6"
TPC 6000	48,000	60,000	120,000	103,920	84,840	3.00	6"

PLEASE NOTE: Capacities shown include both paths and are for one complete sling. Ratings based on straight pin diameter one-half the sling width.

DO NOT EXCEED RATED CAPACITY

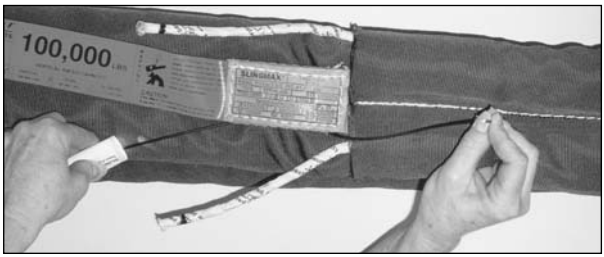
Can fail if damaged, misused or overloaded. Inspect before use. Use only if trained. Observe rated capacity. Avoid sharp edges and exposure to acid, alkali, sunlight and temperature over 180°F. DEATH or INJURY can occur from improper use or maintenance.

⚠ WARNING

FIBER OPTIC INSPECTION FOR ALL TWIN-PATH® SLINGS

United States Patent #5,561,972 & Patents Pending

Twin-Path® slings have the Fiber Optic inspection system. The condition of the internal core yarn can be inspected just by checking the continuity of the fiber optic cable. If crushing or cutting, heat or chemical damage, has occurred, then the damage to the fiber optic cable will destroy its ability to transmit light from one end to the other giving the inspector a reason to remove the sling from service and send it in for repair evaluation. The fiber optic cable will conduct light using natural, overhead or flashlight sources. The inspector simply covers and removes his finger from one end and watches the other end for blinking which indicates that the sling is OK to use for another lift.



TWIN-PATH® TWO LEG BRIDLES

United States Patent #5,727,833 & #4,850,629

TL Simply the lightest and strongest synthetic bridles in the world today. These are perfect to replace existing chain and wire rope bridles. The Twin-Path® synthetic bridle with K-Spec® core yarn is less than half the weight of any steel assembly and is the ergonomic bridle of the future, here today. The loop at the top goes on the crane hook and there is no heavy steel ring to deal with. If you need a four leg bridle, just order two Twin-Path® Two Leg Bridles. Capacities to 200,000 lbs. Please specify the loop size at the top and the hardware such as hooks required on the bottom of each leg. Hooks can be removable if they are attached with G-Link™ connectors. This gives the Twin-Path® Two Leg Bridle added versatility on the job.

TWIN-PATH® TWO LEG BRIDLES

STOCK NUMBERS	VERTICAL	HORIZONTAL ANGLES 60°	HORIZONTAL ANGLES 45°	WT. PER FT. (LBS.)	EYE WIDTH
TPXCTL 1,000	10,000	8,500	7,000	.34	3"
TPXCTL 1,500	15,000	12,750	10,500	.44	3"
TPXCTL 2,000	20,000	17,000	14,000	.61	3"
TPXCTL 3,000	30,000	25,500	21,000	.88	4"
TPXCTL 4,000	40,000	34,000	28,000	1.23	5"
TPXCTL 5,000	50,000	42,500	35,000	1.65	5"

			S-253		S-320	
BOTTOM OF LEG HARDWARE	G-LINK	/ WEIGHT	SYNTHETIC SHACKLE	/ WEIGHT	SLING HOOK	/ WEIGHT
TPXCTL 1,000	2"	2.0	2"	6.9	3T	3.9
TPXCTL 1,500	3"	3.5	2"	6.9	5T	7.3
TPXCTL 2,000	3"	3.5	2"	6.9	5T	7.3
TPXCTL 3,000	4"	7.0	3"	8.9	10T	17.0
TPXCTL 4,000	4"	7.0	3"	8.9	10T	17.0
TPXCTL 5,000	5"	15.0	3"	8.9	15T	33.0

⚠ WARNING Can fail if damaged, misused or overloaded. Inspect before use. Use only if trained. Observe rated capacity. Avoid sharp edges and exposure to acid, alkali, sunlight and temperature over 180°F. DEATH or INJURY can occur from improper use or maintenance.

TWIN-PATH® EYE & EYE SYNTHETIC SLING

United States Patent #5,727,833 & #4,850,629

EE This product is made to be an eye and eye sling only. Usually an eye and eye sling is made from a round sling with a sleeve over it to form the eyes at each end. This sling is light, strong and less expensive than a round sling with a sleeve. It can be manufactured using either K-Spec® core yarn or polyester. Riggers have told us that they have some applications where they want an eye and eye sling only and this is the one with all of the Twin-Path® features in a strictly eye and eye product.

TWIN-PATH® EYE AND EYE SLING

STOCK NUMBERS	CHOKER	VERTICAL	BASKET 60°	VERTICAL BASKET	WT. LBS. PER FT.	WIDTH
TPXCEE 1,000	8,000	10,000	17,320	20,000	.28	3"
TPXCEE 1,500	12,000	15,000	25,980	30,000	.36	3"
TPXCEE 2,000	16,000	20,000	36,640	40,000	.50	3"
TPXCEE 2,500	20,000	25,000	43,300	50,000	.60	4"
TPXCEE 3,000	24,000	30,000	51,960	60,000	.75	4"
TPXCEE 4,000	32,000	40,000	69,280	80,000	1.00	5"
TPXCEE 5,000	40,000	50,000	86,139	100,000	1.40	5"

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⚠ WARNING

Twin-Path® Adjustable Bridle

TPXA (with K-Spec®), TPA (with polyester)

United States Patent #4,850,629 Canadian Patent #1,280,458

The Twin-Path® Adjustable Bridle is the ultimate multiple use rigging tool. It can be used in applications where a standard two leg or four leg bridle is used with the added advantage of self-adjustment to awkward loads. The Twin-Path® Adjustable Bridle self-adjusts over the center of gravity to find the lifting point. The Twin-Path® Adjustable Bridle can also be used as a complete rigging tool for choker, vertical, or basket hitches. The use of two or more Twin-Path® Adjustable Bridles facilitates lifts with multiple lifting points.

TWIN-PATH® ADJUSTABLE BRIDLE SPECIFICATIONS

TPA CODE	SINGLE BRIDLE CAPACITY (LBS.)	APPROX. SLING (WIDTH)	ADJUSTABLE RING DIMENSIONS			SHACKLE DIMENSIONS		SLING WEIGHT (LBS.)	
			RING STOCK DIAMETER	MAIN HOOK AREA (WIDTH)	RING AREA (LENGTH)	NOMINAL SHACKLE SIZE	TONNAGE (W.L.L.)	APPROX. 3 FOOT BASE	APPROX. ADDER PER FOOT
TPA 6	6,000	2"	1/2"	2-1/2"	2-1/2"	5/8"	3-1/4T	4.40	1.35
TPXA 12	12,000	3"	3/4"	3"	3"	7/8"	6-1/2T	6.80	1.95
TPXA 20	20,000	4"	1"	4"	4"	1-1/4"	12T	13.60	2.70
TPXA 40	40,000	5"	1-1/2"	5-1/4"	5-1/4"	1-3/4"	25T	31.10	4.20
TPXA 60	60,000	5"	2"	7"	7"	2"	35T	60.00	5.70
TPXA 90	90,000	6"	2-1/4"	8"	8"	2-1/4"	55T	86.00	8.10

PLEASE NOTE: Capacities shown include both paths and are for one complete assembly.

DO NOT EXCEED RATED CAPACITY

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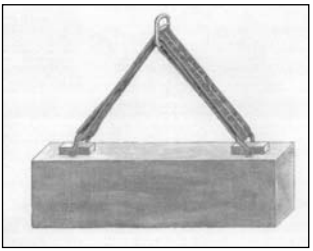
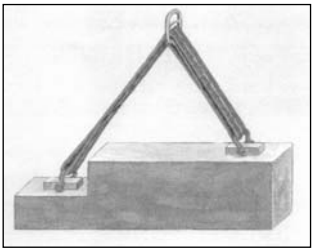
Twin-Path® Adjustable Bridle

Hanes SUPPLY, INC.
YOUR SLING AND RIGGING SPECIALIST

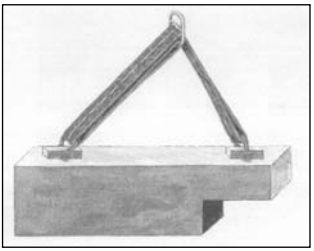
The Twin-Path® Adjustable Bridle sling is a multi-purpose rigging tool and it's important that it is used properly. The adjustment ring has a double sling on one side and a single sling on the other side.



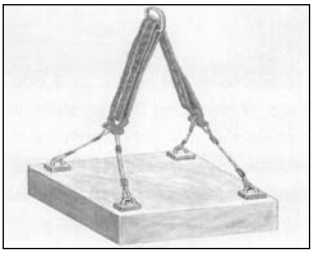
If the lifting points are an equal distance from the center of gravity, then the Twin-Path® Adjustable can be hooked-up with the double or single sling on either lifting point.



If the lifting points are an equal distance on either side of the center of gravity but one is higher, then the double sling should be attached to the higher lifting point.



If one of the lifting points is closer to the center of gravity, then attach the double sling to this lifting point. It will have the highest weight concentration. If the Twin-Path® Adjustable is attached so that the single sling is nearest the center of gravity, it will not allow the lift to be made.



Never use the Twin-Path® Adjustable Bridle in situations where the sling-to-hook angle is greater than 45°. Always connect above the center of gravity. If connections are made below the center of gravity, then the load may turn when lifted.

Can fail if damaged, misused or overloaded. Inspect before use. Use only if trained. Observe rated capacity. Avoid sharp edges and exposure to acid, alkali, sunlight and temperature over 180°F. DEATH or INJURY can occur from improper use or maintenance.

⚠ WARNING

SPARKEATER® SYNTHETIC SLINGS

U.S. Patent #4,850,629; CN Patent #1,280,458

SE When you have a hot environment up to 300°F, use a Sparkeater® to lift the load without marring the surface of the lifted piece. Also, when doing stage rigging order this product for the protection it gives from exposure to fire, heat, sparks and pyrotechnics. Just specify black color for the theater or yellow for all other applications. These slings are made from Nomex® for the cover and Aramid high-performance core yarns. Available in capacities of 2,000 to 30,000 lbs. When lifting heated steel, wire rope or chain slings might scratch the load causing expensive rework. Fire exposure testing was performed by the Offshore Certification Bureau and the product was identified as being as good as wire rope or chain for use in off shore applications in the oil industry.

TWIN-PATH® SPARKEATER SPECIFICATIONS

STOCK NUMBER	SLING WIDTH	RATED CAPACITIES			APPROX. WEIGHT LBS. PER FT. (Bearing-Bearing)
		CHOKER	VERTICAL	BASKET	
TPSE 200	2.5"	1,600	2,000	4,000	.20
TPSE 400	2.5"	3,200	4,000	8,000	.24
TPSE 600	2.5"	4,800	6,000	12,000	.28
TPSE 1000	3"	8,000	10,000	20,000	.31
TPSE 2000	3"	16,000	20,000	40,000	.55
TPSE 3000	4"	20,000	30,000	60,000	.80

PLEASE NOTE: Capacities shown include both paths and are for one complete sling.

DO NOT EXCEED RATED CAPACITY

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Wear pads such as Cornermax™ and Synthetic Armor Wear Pads protect loads and slings. These wear pads contain a variety of synthetic and metallic materials, and can be made ready to use in any length or width to fit wire rope, chain, nylon webbing, or any regular rope or sling product. They can also be made in long lengths which the customer can cut into suitable sizes on the job. Among all our wear pads and corner protectors, you can find the appropriate materials to provide cut resistance for the most severe conditions.

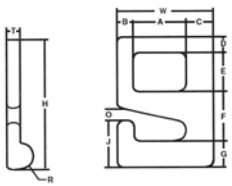
Hanes SUPPLY, INC.
YOUR SLING AND RIGGING SPECIALIST

G-Link™ Synthetic Sling Connector

Patent #5,651,573

PRODUCT FEATURES:

- ✓ Couples web, round or Twin-Path® slings with hardware (oblongs or hooks).
- ✓ Splices two slings into longer length.
- ✓ Connects two slings with oblong and two hooks into bridle sling.
- ✓ Allows sling to be used as sliding choker sling.
- ✓ Two G-Link™ connectors used together will double the rated capacity of one G-Link™ connector.
- ✓ Conforms with ASME B30.9 web and round sling specifications.



MODEL NUMBER	VERTICAL RATED CAP. (TONS)	CHOKER RATED CAP. (TONS)	SLING SIZE (IN.)	WGT. (LBS.)
SC200L	2-1/2	2	2"	2
SC300L	5	3	3"	3-1/2
SC400L	7-1/2	4	4"	7
SC500L	15	8	5"	15
SC600L	25	12	6"	29

G-LINK™ SYNTHETIC SLING CONNECTOR DIMENSIONS

MODEL	A	B	C	D	E	F	G	H	J	O	R	T	W
SC200L	2	5/8	1-1/8	5/8	1-1/8	1-15/16	1	5.00	1-13/16	1/2	.50	.50	3.50
SC300L	3	11/16	1-1/4	11/16	2-1/4	2-7/16	1-1/4	6.62	2-1/2	9/16	.75	.75	5.00
SC400L	4	13/16	1-3/8	13/16	2-1/2	2-7/8	1-3/8	7.50	2-3/4	3/4	.75	1.00	6.00
SC500L	5	1-1/16	2	1-1/16	3	3-3/4	2	9.75	3-3/4	1	1.00	1.25	8.00
SC600L	6	1-1/4	2-1/4	1-1/4	4	5	2-1/4	12.50	4-3/4	1-1/4	1.00	1.50	9.38

Connect Hook or Oblong to Sling

Choker Sling

Connect Two Slings

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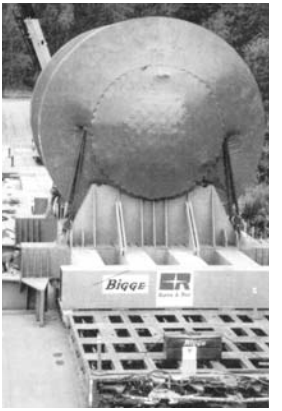
TWIN-PATH®

SLINGS IN ACTION



7.0 - MECHANICAL CONSIDERATIONS

7.1 Determine the weight of the load. The weight of the load shall be within the rated capacity of the sling.

7.2 Select a sling having suitable characteristics for the type of load, hitch and environment.

7.3 Slings shall not be loaded in excess of the rated capacity. Consideration shall be given to angle of lift which may affect the lifting capacity. Diameters of pins and sharp edges also may affect the capacity of the lifting sling.

7.4 Slings used in a choker shall not be forced to tighten around the load by pounding with hammers or other objects. Choker hitches are the least effective way to use a sling based on capacity. Two chokers should be used to balance the load. One choker in the center of the load may create an unbalanced situation which could lead to an accident.

7.5 Slings used in a basket hitch must have the load balanced to prevent slippage and accidents.

7.6 Slings used with fittings shall be compatible with the fittings used. The lifting capacity shall be rated at the lower of the fitting or sling. Fitting openings shall be of the proper shape and size to assure that the sling will seat properly.

7.7 Slings shall be protected from cutting and sharp edges. All sharp protrusions and abrasive surfaces will be kept from contact with the sling. Where unavoidable situations develop, padding shall be placed between the sling and the load. **The pin area of a shackle can cause synthetic slings to cut and placing synthetic slings on the pin should be avoided.**

7.8 Slings shall not be dragged on the floor or drawn across other surfaces which may damage the sling.

7.9 Slings shall not be twisted or tied in knots to shorten.

7.10 Slings shall not be pulled from under loads resting on the sling.

7.11 Do not drop objects on slings or run over them with vehicles.

7.12 Slings which are damaged shall not be used.

7.13 Sling hitches must provide control of the load.

7.14 Portions of the human body shall be kept from between the sling and the load and from between the sling and any attachment to lifting devices such as hooks.

7.15 Personnel shall stand clear of suspended loads.

7.16 Personnel shall not ride on the sling or suspended loads.

7.17 Avoid snatch or shock loading.

7.18 Twisting and kinking the legs of the sling shall be avoided.

7.19 Load applied to the hook should be centered in the bowl of the hooks. Do not point load the hook.

7.20 During lifting with or without the load all personnel shall be alert for possible snagging.

7.21 The slings should contain or support the load from the sides above the center of gravity so that the load will not tilt when the load is lifted.

7.22 Slings shall be of the proper length so that the angle of the sling to the load does not reduce the rated capacity of the sling for a given angle.

7.23 Only legibly-marked or labeled slings should be used. If the tag is not legible, or missing, the sling should not be used.

7.24 Keep labels or tags away from the load, the hook and the angle of choke.

7.25 Synthetic slings should be inspected each time before each lift.

8.0 - ENVIRONMENTAL CONSIDERATIONS

8.1 When not in use, synthetic slings should be stored in a clean, dry place. Heat sources and non-ventilated places should be avoided.

8.2 Chemically active environments can affect the strength of synthetic lifting slings. Different chemicals will react with different exposure to Covermax bulked nylon, polyester, aramids, and Olefins. Please see the enclosed tables for reactions of specific chemicals.

Aramids are resistant to most ketones, alcohols, dry cleaning solvents and many other organic solvents. Its acid resistance is superior to that of nylon but is not as good as that of polyester. Aramids show good resistance to alkalis at room temperature, but is degraded by strong alkalis at higher temperatures.

Aramids are compatible with fluorine-containing elastomers, resins, and refrigerants at high temperatures, and is resistant to fluorine compounds in concentrations usually encountered in stack gases from metallurgical and rock-processing operations.

The resistance of aramids to oxides of sulphur at temperatures above the acid dew point is superior to that of polyester. Below the dew point, concentrated sulphuric acid may condense on the fiber and cause a progressive loss in strength.

In moderate-to-strong acid or alkali environments, evaluation of aramids should be made to ensure that the yarn will perform acceptably before use.

Polyester and nylon are not significantly affected by most compounds of the following classes:

Alcohols
Dry Cleaning Solvents
Halogenated Hydrocarbons
Ketones
Soaps and Synthetic Detergents
Water (Including Sea Water)

Polyester also shows good-to-excellent resistance to:

- Aqueous solutions of most weak acids at the boil, and to most strong acids at room temperature, but is disintegrated by concentrated (95%) sulphuric acid at room temperature.
- Aqueous solutions of strong alkalis at room temperature, but is degraded at the boil.
- Oxidizing agents, and is not degraded by bleaching treatments ordinarily used for textiles.

Nylon is not significantly affected by most aldehydes, alkalis, ethers, or hydrocarbons, but is deteriorated by dilute acids (e.g., hydrochloric acid and sulphuric acid in 10% concentrations at room temperature cause a noticeable loss in breaking strength in 10 hours).

Solvents for nylon includes:

Concentrated formic acid
Phenolic compounds at room temperature
Calcium chloride in methanol at room temperature

Hot solutions of calcium chloride in:
Glacial Acetic Acid
Ethylene Chlorohydrin
Ethylene Glycol

Hot solutions of zinc chloride in methanol
Benzyl alcohol at the boil

Aramids are resistant to most weak acids and alkalis, ketones, alcohols, hydrocarbons, oils and dry cleaning solvents. Strong acids and bases and sodium hypo-chlorite bleach attack aramids, particularly at high temperatures of high concentrations.

K-Spec™ core yarn strength retention is based on test results of components at 65°C/150°F (or less) for 6 months. K-Spec™ has a 100% strength retention when exposed to: Age, 10% detergent solution, rot and mildew, sunlight and Toluene; 99% strength retention when exposed to: acetic acid, gasoline, hydrochloric acid 1m, hydraulic fluid, kerosene, and sea water; 98% retention when exposed to: 25% ammonium hydroxide, 10% hypophosphite solution, and 40% phosphoric acid; 97% retention when exposed to 5m sodium hydroxide; 95% retention when exposed to Portland cement and sulfuric acid; and 88% retention when exposed to Clorox®, and nitric acid.

9.0 - FIBER CHARACTERISTICS

(Using Nylon as a basis of 1.0)

GENERIC FIBER TYPE	NYLON	POLYESTER	POLYPRO-PYLENE	HDPE OLEFIN	ARAMID	K-SPEC
Bulk Strength[1]	1.0	.9-1.1	.55	2.8	2.7	2.75
Weight	1.0	1.21	.80	.85	1.26	1.01
Working[2] Elastic Elongation	1.0	.60	.80	.10	.10	.10
Co-efficient[3] of Friction	.10-.12	.12-.15	.15-.25	.08	.10-.12	.10
Melting Point	460°F	480°F	330°F	297°F	Chars at 800°F	Chars at 297°F
Critical[4] Temperature	180°F	180°F	180°F	150°F	300°F	180°F
Specific Gravity	1.14	1.38	.91	.97	1.44	1.2
Cold-Flow (Creep)	Negligible	Negligible	Negligible to High	Negligible to High	Negligible	Negligible

[1]Bulk Strength is defined as strength per circumference squared.
[2]Working is defined as rope actually in use under a cycling load.
[3]Co-efficient of friction is based on reluctance to slip or slide.
[4]Critical temperature is defined as the point at which degradation is caused by temperature alone.

Cold-Flow (Creep) is defined as fiber deformation (elongation) due to molecular slippage under a constant steady static loading situation. Fibers that have this inherent characteristic will display extremely low or negligible creep if minor fluctuations occur in the rate and/or frequency of load levels. In rope form, this would apply to polypropylene, polyethylene, and HDPE Olefin fibers.

10.0 - INSPECTIONS OF TWIN-PATH® PRODUCTS

10.1 Tell-Tails should extend 1/2" past the tag area of each sling. If both Tell-Tails are not 1/2" long, remove the sling from service. If the Tell-Tails show evidence of chemical degradation, remove the sling from service. Send to the manufacturer for repair evaluation.

10.2 Slings should be inspected for evidence of cutting or tearing of the outer cover. Slings with cuts should be removed from service and sent back to the manufacturer for repair evaluation. Damage to the cover may indicate core damage.

10.3 Inspect slings for evidence of heat damage. Slings with polyester or Covermax covers should not be exposed to temperature above 82°C/180°F. Aramid Sparkeater Slings should not be exposed to temperatures above 149°C/300°F. K-spec Core Slings should not be exposed to temperatures above 82°C/180°F. Cold temperature exposure down to minus 40°C/minus 40°F do not effect the strength of the products. Other temperatures should be referred to the manufacturer.

10.4 Slings using aluminum fittings shall not be used where fumes, vapors, sprays, or mists of alkalis or acids are present.

10.5 Twin-Path® Lifting Slings and any fittings attached should be the subject of frequent and regular inspections. In addition to the initial inspection by a competent person and frequent written inspections, the slings should be visually inspected before each use.

10.6 Written inspections should be performed as required and documents of such inspection by a competent person shall be kept on file in the safety department of the plant or site where used. Inspections may be done more often based on frequency of use, severity of conditions and experience of past service life.

10.7 Slings should be examined throughout their length for abrasion, cuts, heat damage, fitting distortion or damage, tag legibility, and if any doubts are held by the inspector, the sling should be removed from service. Core integrity is determined by fiber optic light transfer if this type of tell-tail is installed in the sling. If a deterioration is found, the sling must be removed from service and returned to the manufacturer for evaluation.

10.8 Slings removed from service that are not capable of repair should be destroyed and rendered completely unfit for future use.

10.9 Abrasion, heat damage or cuts to the cover may indicate a loss of strength to the load core and these slings should not be used until evaluated by the manufacturer. At area of damage, cover should be opened and the core yarns counted and visually inspected.

11.0 - TEST PROCEDURES FOR COMPLETE TWIN-PATH® SLING PRODUCTS

11.1 For proof testing, the pins shall be 1" in diameter or larger.

11.2 Proof tests shall consist of pulling the slings to twice their rated capacity. Slings shall be held at the proof test limit for a period of 15 seconds and then the tension may be released.

11.3 Testing of Twin-Path® Sling products and load yarn shall be on a certified and currently calibrated testing machine, which meets or exceeds the standards as described in ASME E-4.

11.4 Break testing of slings shall be as above with results documented. Pin size for break testing should be a diameter equal to half the sling width, or larger.

11.5 Proof testing is recommended for every sling.

11.6 After the sling is proof tested, the Tell-Tails should then be trimmed to length prior to shipment.

11.7 Repaired fittings or slings shall be proof-tested before they are returned to service.

THESE RECOMMENDED STANDARD SPECIFICATIONS HAVE BEEN FORMULATED AS A GUIDE TO USERS, INDUSTRY AND GOVERNMENT TO INSURE THE PROPER USE, MAINTENANCE AND INSPECTION OF TWIN-PATH® LIFTING SLING PRODUCTS.

SINGLE PATH - ENDLESS POLYESTER ROUND SLINGS

ITEM NO.	COLOR	RATED CAPACITY (LBS) VERTICAL	CHOKER	BASKET	MIN. LGTH. (FT)	APPROX. MEASUREMENTS WT. (LBS/FT)	BODY DIA. RELAXED (IN)	WIDTH @ LOAD (IN)
SP260	Purple	2,600	2,100	5,200	1-1/2	.2	5/8	1-1/8
SP530	Green	5,300	4,200	10,600	1-1/2	.3	7/8	1-1/2
SP840	Yellow	8,400	6,700	16,800	3	.4	1-1/8	1-7/8
SP1060	Tan	10,600	8,500	21,200	3	.5	1-1/8	2-1/8
SP1320	Red	13,200	10,600	26,400	3	.7	1-3/8	2-1/4
SP1680	White	16,800	13,400	33,600	3	.8	1-3/8	2-1/2
SP2120	Blue	21,200	17,000	42,400	3	1.1	1-3/4	3
SP3100	Grey	31,000	24,800	62,000	3	1.6	2-1/4	3-3/4
SP5300	Brown	53,000	42,400	106,000	8	2.5	2-3/4	4-5/8
SP6600	Olive	66,000	52,800	132,000	8	3.1	3-1/8	5-1/4
SP9000	Black	90,000	72,000	180,000	8	4.0	3-5/8	6

PLEASE NOTE: Sling cover color can change to meet customer specifications.

DO NOT EXCEED RATED CAPACITY.

LIFTING FIBERS – Endless loops of polyester load bearing yarn.

COVER – Polyester contrasting color cover.
Aramid outer covers also available for heat protection.

LABEL – Plastic or leather available - Private labeling also.

CAPACITIES – 3000 pounds to 60,000 pounds vertical rated capacity.

DESIGN FACTOR – 5 to 1.

COLORS – Wide variety available (including BLACK for stage rigging).

CONFIGURATIONS – Roundsling or eye-and-eye.

APPLICATIONS – Vertical, basket or choker.

INSPECTION – Slings should be examined throughout their length for abrasion, cuts, heat damage, fitting distortion or damage, and tag legibility. Abrasion, heat damage, or cuts to the cover may indicate a loss of strength to the load core. If any doubts are held by the inspector, the sling should be taken out of service. Slings removed from service that are not capable of repair shall be destroyed and rendered completely unfit for future use.

Can fail if damaged, misused or overloaded. Inspect before use. Use only if trained. Observe rated capacity. Avoid sharp edges and exposure to acid, alkali, sunlight and temperature over 180°F. DEATH or INJURY can occur from improper use or maintenance.

⚠ WARNING

TRI-FLEX SLINGS IN ACTION

CERTIFIED PROOF TESTING
SLINGS – WIRE ROPE – CHAIN – NYLON – FITTINGS

Patent #4,043,581

PIN SIZE EQUALS
D/d OF 4/1 USING
COMPONENT PARTS

BASKET HITCH EQUALS
D/d OF 5/1 USING
FINISHED DIAMETER

TRI-FLEX® ENGINEERING INFORMATION

EQUIVALENT TO STANDARD SIZE FLEMISH EYE SLING	COMPOSED OF 3 PARTS OF EIP ROPE	VERTICAL	PUBLISHED 5 TO 1 RATED LOAD TONS CHOKER	VERTICAL BASKET	FINISHED ACTUAL DIAMETER	WEIGHT PER FT. APPROX.
7/16"	1/4"	1.7	1.3	3.4	1/2"	.44
9/16"	5/16"	2.6	1.9	5.2	5/8"	.68
5/8"	3/8"	3.6	2.7	7.2	3/4"	.99
3/4"	7/16"	4.9	3.7	9.8	7/8"	1.33
7/8"	1/2"	6.4	4.8	12.8	1"	1.75
1"	9/16"	8.0	6.0	16.0	1-1/8"	2.24
1-1/8"	5/8"	9.9	7.4	19.8	1-1/4"	2.73
1-1/4"	3/4"	14.0	10.5	28.0	1-1/2"	3.9
1-1/2"	7/8"	19.0	14.3	38.0	1-3/4"	5.4
1-3/4"	1"	24.8	18.6	49.6	2"	7.0
2"	1-1/8"	31.2	23.4	62.4	2-1/4"	8.9
2-1/4"	1-1/4"	38.4	28.8	76.8	2-1/2"	10.0
2-1/2"	1-3/8"	46.0	34.5	92.0	2-3/4"	13.3
2-3/4"	1-1/2"	55.0	41.2	110.0	3"	15.8
3"	1-5/8"	63.4	47.6	126.8	3-1/4"	18.5
3-1/4"	1-3/4"	73.0	54.8	146.0	3-1/2"	21.5
3-1/2"	2"	95.0	71.2	190.0	4"	28.0
4"	2-1/4"	118.0	88.5	236.0	4-1/2"	35.6
4-1/2"	2-1/2"	145.0	109.0	290.0	5"	44.0

TRI-FLEX® WIRE ROPE SLINGS provide the best combination of strength and flexibility. Because of the patented TRI-FLEX® SLING construction, there is a large savings in material and machine costs in the larger sizes; this, combined with ease of use make TRI-FLEX® SLINGS the only sling for smart buyers.

Inspect before use. Follow OSHA, ANSI B30.9 or Manufacturers Guidelines. Use by untrained persons is hazardous. Improper use will result in serious injury or death. Do not exceed rated capacity. This product will fail if damaged, abused, misused, overused or improperly maintained.

⚠ WARNING

TRI-FLEX® SLING SYSTEM

U.S. Patent #4,240,659; CN Patent #1,082,755; British #2,029,796

This product is a combination of three Tri-Flex® Wire Rope slings wrapped together helically to form a nine-part finished body sling. After a heavy lift is finished, the product can be taken apart to form three individual Tri-Flex® slings for smaller lifting work. This product was developed for construction projects where there are a few heavy lifts. A superior strength sling because it has twelve parts of wire rope in the loop for greater strength than traditional nine-part wire rope slings that have only ten parts of wire rope in the loops.

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CERTIFIED PROOF TESTING
SLINGS – WIRE ROPE – CHAIN – NYLON – FITTINGS

Rated Load with 5-1 Factor / Rated Load in Tons

	ONE TRI-FLEX® SLING 3 PARTS EIP PIN DIAMETER = 4 X'S COMPONENT PART		THREE TRI-FLEX® SLINGS 9 PARTS EIP PIN DIAMETER = 4 X'S COMPONENT PART		NINE TRI-FLEX® SLINGS 27 PARTS EIP PIN DIAMETER = 8 X'S COMPONENT PART	
Diameter of Component Parts	VERTICAL RATED LOAD	FINISHED DIAMETER	VERTICAL RATED LOAD	FINISHED DIAMETER	VERTICAL RATED LOAD	FINISHED DIAMETER
1/4"	1.7	1/2"	4.6	1"	12.9	2"
5/16"	2.6	5/8"	7.0	1-1/4"	19.9	2-1/2"
3/8"	3.6	3/4"	10.0	1-1/2"	28.5	3"
7/16"	4.9	7/8"	13.8	1-3/4"	38.6	3-1/2"
1/2"	6.4	1"	18.0	2"	50.0	4"
9/16"	8.0	1-1/8"	22.7	2-1/4"	63.5	4-1/2"
5/8"	9.9	1-1/4"	27.8	2-1/2"	78.0	5"
3/4"	14.0	1-1/2"	39.7	3"	110.0	6"
7/8"	19.0	1-3/4"	53.7	3-1/2"	150.0	7"
1"	24.8	2"	69.8	4"	195.0	8"
1-1/8"	31.2	2-1/4"	87.7	4-1/2"	245.0	9"
1-1/4"	38.4	2-1/2"	108.0	5"	302.0	10"
1-3/8"	46.0	2-3/4"	130.0	5-1/2"	363.0	11"
1-1/2"	55.0	3"	154.0	6"	430.0	12"
1-5/8"	63.4	3-1/4"	178.0	6-1/2"	499.0	13"
1-3/4"	73.0	3-1/2"	206.0	7"	578.0	14"
2"	95.0	4"	267.0	8"	748.0	16"
2-1/4"	118.0	4-1/2"	333.0	9"	934.0	18"
2-1/2"	145.0	5"	408.0	10"	1140.0	20"

ONE TRI-FLEX® SLING IS A COMPLETE SLING WITH 3 PARTS FOR FLEXIBILITY.

9-PART TRI-FLEX® SLINGS BREAK DOWN INTO THREE 3-PART STANDARD TRI-FLEX® SLINGS.

27-PART TRI-FLEX® SLINGS BREAK DOWN INTO THREE 9-PART SLINGS OR NINE 3-PART SLINGS.

The **TRI-FLEX® SYSTEM** allows the purchase of multiple part slings for big lifts which can easily be taken apart to provide slings for smaller lifts or for storage.

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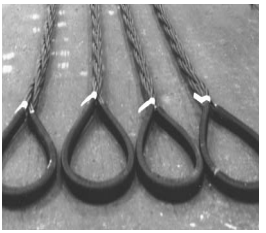
GATOR-MAX® WIRE ROPE SLING WITH PARALLEL EYES

U.S. Patent #5,561,973 & Patents Pending



This is the strongest multi-part sling with great flexibility. It will develop its full strength on small pins with a D/d ratio of 1/1 where D is the pin and d is the sling body. (4/1 D/d when comparing the pin to the component parts.) For heavy lifting work this is the most efficient wire rope sling that meets all of the standards. The eyes have the wire ropes (12) laid in parallel so that there is no cross-over and then they are wrapped with heavy duty material to keep them in position. This sling was developed to meet conditions specified by the US Navy and the Wire Rope Technical Board Sling Manual. Testing has proven it to be the strongest multi-part wire rope sling when attached to small pins because it has twelve parts of wire rope in the loop in a parallel construction.

GATOR-MAX® AND GATOR-LAID® SLINGS TECHNICAL CHART

Rated Capacity is based on 5-1 Design Factor.

FINISHED DIAMETER	COMPONENT PARTS	STD. EYE SIZE	VERTICAL RC	CHOKER RC	BASKET RC	WGT. PER FT.
1/2"	1/8"	8"	1.4	.95	2.7	.26
5/8"	3/16"	10"	1.8	1.4	3.6	.40
3/4"	5/32"	12"	2.7	2.0	5.5	.59
7/8"	7/32"	14"	3.7	2.7	7.4	.77
1"	1/4"	16"	4.8	3.6	9.7	.99
1-1/4"	5/16"	18"	7.4	5.5	14.7	1.56
1-1/2"	3/8"	20"	10.5	7.9	21.0	2.19
1-3/4"	7/16"	22"	14.0	11.0	29.0	3.15
2"	1/2"	24"	19.0	14.0	38.0	4.14
2-1/4"	9/16"	26"	24.0	19.0	48.0	5.31
2-1/2"	5/8"	28"	29.0	22.0	58.0	6.48
3"	3/4"	30"	42.0	31.0	83.0	9.36
3-1/2"	7/8"	35"	56.0	42.0	112.0	12.78
4"	1"	40"	74.0	55.0	146.0	16.65
4-1/2"	1-1/8"	45"	92.0	69.0	184.0	21.06
5"	1-1/4"	50"	113.0	85.0	227.0	26.01
5-1/2"	1-3/8"	55"	137.0	102.0	273.0	31.50
6"	1-1/2"	60"	162.0	121.0	323.0	37.44
7"	1-3/4"	70"	216.0	162.0	432.0	51.03
8"	2"	80"	280.0	210.0	560.0	66.51
9"	2-1/4"	90"	350.0	261.0	700.0	84.24
10"	2-1/2"	100"	428.0	321.0	856.0	104.00

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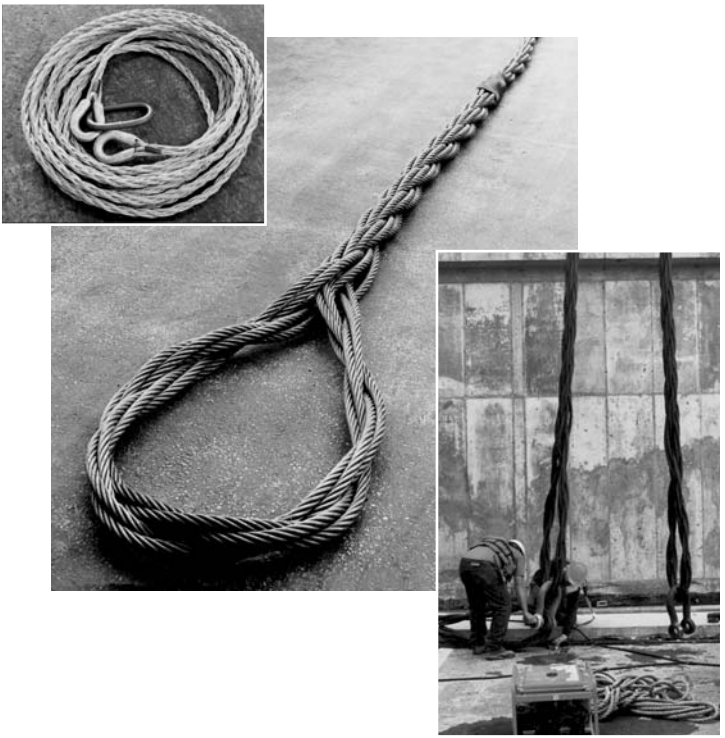
GATOR-LAID® WIRE ROPE SLING

U.S. Patent #4,240,659 & #5,561,973

This is identical to the Gator-Max™ sling with the parallel eyes except it has metal sleeves for the splice connection. This is the product when a big lift but short sling is required. It also has twelve parts of wire rope in the loop. The Gator-Flex® and Gator-Laid® products were developed in conjunction with the off-shore oil industry to provide the world's best heavy lift wire rope slings.



GATOR-FLEX® WIRE ROPE SLING

U.S. Patent #5,561,973

This sling has a nine-part body style with wires in the eyes that are crossed or interwoven so no wrapping is necessary. This sling was developed in conjunction with riggers who preferred a sling for heavy lifts that could be visually inspected and have the highest flexibility possible in a multi-part wire rope sling.

T&D ULTRA-FLEX WIRE ROPE SLING

U.S. Patent #5,561,973

This wire rope sling is an extremely flexible product with great applications for general rigging purposes in the utility industry. It makes a fantastic choker sling especially when lifting poles. Development was through a committee composed of utility company workers and members of the SLINGMAX® design team. Actual field testing was used to determine merits of the final product.

GATOR-FLEX® AND T&D ULTRA-FLEX SLINGS TECHNICAL CHART

FINISHED DIAMETER	COMPONENT PARTS	STD. EYE SIZE	VERTICAL RC	CHOKER RC	BASKET RC	WGT. PER FT.
1/2"	1/8"	8"	1.3	.9	2.6	.26
5/8"	5/32"	10"	1.7	1.3	3.4	.40
3/4"	3/16"	12"	2.6	1.9	5.2	.59
7/8"	7/32"	14"	3.5	2.6	7.0	.77
1"	1/4"	16"	4.6	3.4	9.2	.99
1-1/4"	5/16"	18"	7.0	5.2	14.0	1.56
1-1/2"	3/8"	20"	10.0	7.5	20.0	2.19
1-3/4"	7/16"	22"	13.8	10.3	27.6	3.15
2"	1/2"	24"	18.0	13.5	36.0	4.14
2-1/4"	9/16"	26"	22.7	18.1	45.4	5.31
2-1/2"	5/8"	28"	27.8	20.8	55.6	6.48
3"	3/4"	30"	39.7	29.8	79.4	9.36
3-1/2"	7/8"	35"	53.7	40.3	107.4	12.78
4"	1"	40"	69.8	52.3	139.6	16.65
4-1/2"	1-1/8"	45"	87.7	65.8	175.4	21.06
5"	1-1/4"	50"	108.8	81.0	216.0	26.01
5-1/2"	1-3/8"	55"	130.0	97.5	260.0	31.50
6"	1-1/2"	60"	154.0	115.5	308.0	37.44
7"	1-3/4"	70"	206.0	154.5	412.0	51.03
8"	2"	80"	267.0	200.2	534.0	66.51
9"	2-1/4"	90"	333.0	249.7	666.0	84.24
10"	2-1/2"	100"	408.0	306.0	816.0	104.00

Rated capacity is based on 5-1 Design Factor.

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⚠ WARNING

Gator-Flex®/Twin-Flex™ Grommets

GATOR-FLEX®
NINE PART GROMMETS

U.S. Patent #5,561,973

Ultra flexible slings for that short heavy lift connection. These slings can be made shorter than standard multi-part slings, but maintain all of the advantages.

TWIN-FLEX™
WIRE ROPE SLINGS

U.S. Patent #5,561,973

This is another model of a grommet-type sling which is formed into an eye and eye design. It consists of 18 body parts with a loop at each end. This is extremely flexible and is used where short, heavy lift slings are required.

CERTIFIED PROOF TESTING TO ANY STANDARD YOU SPECIFY – WE COMPLY!

The Most Flexible Grommet in the World!

TWIN-FLEX® SLINGS AND GATOR-FLEX® GROMMETS ENGINEERING SPECIFICATIONS

PIN SIZE 5 X FD DIAMETER	9 PARTS WIRE ROPE SIZE	TONS (2,000 LBS)			WT. PER FOOT LBS.
		VERTICAL	CHOKER	BASKET VERTICAL	
1"	1/4"	10	7	20	2
1-1/4"	5/16"	15	11	30	3
1-1/2"	3/8"	22	15	44	5
1-3/4"	7/16"	29	21	58	6
2"	1/2"	38	27	76	8
2-1/4"	9/16"	48	34	96	11
2-1/2"	5/8"	59	42	118	13
3"	3/4"	85	59	170	19
3-1/2"	7/8"	115	81	230	25
4"	1"	148	104	296	33
4-1/2"	1-1/8"	187	131	374	42
5"	1-1/4"	230	161	460	52
5-1/2"	1-3/8"	276	194	552	63
6"	1-1/2"	328	230	656	75
7"	1-3/4"	441	308	882	102
8"	2"	570	399	1140	133
9"	2-1/4"	711	498	1422	168
10"	2-1/2"	870	609	1740	209
11"	2-3/4"	1040	728	2080	250
12"	3"	1224	857	2448	300

Rated Capacity at 5-1 D/F
D/d = 5/1

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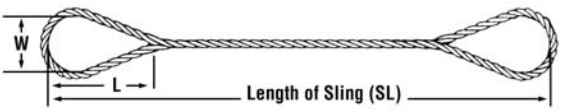
⚠ WARNING

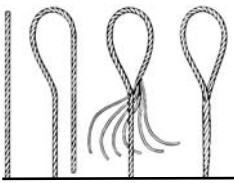
Hanes SUPPLY, INC.
YOUR SLING AND RIGGING SPECIALIST

Hand-Spliced Slings

NO. 100 B



The end of a single wire rope is bent back along the rope to form the eye, and strands are hand-tucked into the body of the rope in what is called a tapered and concealed splice. This splice makes a sling that is easily pulled through narrow spaces; there are no rough ends to snag hands. Slings with rope bodies larger than 1-1/2" diameter are made only with Burnt End splices in which ends of strands are left exposed and cut off with a torch. These may also be cut shorter and served, for smoothness. All have the same rated capacity, size for size.



Hand Spliced Eye

The tapered and concealed splice utilizes tension in the rope body to secure strands where they are tucked back into the rope. Needs no metal sleeve to assure firm anchoring. When "tapered and concealed", ends of strands are tucked inward and concealed inside the rope.

WARNING: Hand-spliced slings should not be used in lifts where the sling may rotate and cause the wire rope to unlay.

Diam. of Rope (in.)	Min. Length (SL) of Sling (ft.–in.)	Loop Dimensions W (in.)	Loop Dimensions L (in.)	RATED CAPACITIES IN TONS (2000 LBS.) IPS ROPE - FIBER CORE Choker Hitch	IPS ROPE - FIBER CORE Single Leg Vertical	IPS ROPE - FIBER CORE BASKET HITCH 30°	IPS ROPE - FIBER CORE BASKET HITCH 45°	IPS ROPE - FIBER CORE BASKET HITCH 60°	IPS ROPE - IWRC Choker Hitch	IPS ROPE - IWRC Single Leg Vertical	IPS ROPE - IWRC BASKET HITCH 30°	IPS ROPE - IWRC BASKET HITCH 45°	IPS ROPE - IWRC BASKET HITCH 60°	EIPS ROPE - IWRC Choker Hitch	EIPS ROPE - IWRC Single Leg Vertical	EIPS ROPE - IWRC BASKET HITCH 30°	EIPS ROPE - IWRC BASKET HITCH 45°	EIPS ROPE - IWRC BASKET HITCH 60°
3/8	2–6	3	6	.085	1.1	1.9	1.6	1.1	0.92	1.2	2.1	1.7	1.2	1.1	1.3	2.3	1.8	1.3
7/16	2–9	3½	7	1.2	1.4	2.4	2.0	1.4	1.2	1.5	2.6	2.1	1.5	1.4	1.8	3.1	2.5	1.8
1/2	3	4	8	1.5	1.8	3.1	2.5	1.8	1.6	2.0	3.5	2.8	2.0	1.9	2.3	4.0	3.3	2.3
9/16	3–6	4½	9	1.9	2.3	4.0	3.3	2.3	2.0	2.5	4.3	3.5	2.5	2.4	2.9	5.0	4.1	2.9
5/8	4	5	10	2.3	2.8	4.8	4.0	2.8	2.5	3.0	5.2	4.2	3.0	2.9	3.5	6.1	4.9	3.5
3/4	4–6	6	12	3.3	3.9	6.8	5.5	3.9	3.6	4.2	7.3	5.9	4.2	4.1	4.8	8.3	6.8	4.8
7/8	5–6	7	14	4.5	5.2	9.0	7.4	5.2	4.8	5.5	9.5	7.8	5.5	5.6	6.4	11	9.0	6.4
1	6	8	16	5.9	6.7	12	9.5	6.7	6.3	7.2	12	10	7.2	7.2	8.3	14	12	8.3
1-1/8	6–6	9	18	7.4	8.4	15	12	8.4	7.9	9.0	16	13	9.0	9.1	10	17	14	10
1-1/4	7	10	20	9.0	10	17	14	10	9.7	11	19	16	11	11	13	23	18	13
1-3/8	7–6	11	22	11	12	21	17	12	12	13	23	18	13	13	15	26	21	15
1-1/2	8–6	12	24	13	15	26	21	15	14	16	28	23	16	16	18	31	25	18
1-5/8	9	13	26	15	17	29	24	17	16	18	31	25	18	18	21	36	30	21
1-3/4	9–6	14	28	17	20	35	28	20	19	21	36	30	21	21	24	42	34	24
2	11	16	32	22	26	45	37	26	24	28	48	40	28	28	32	55	45	32
2-1/4	12–6	18	36	28	32	55	45	32	30	34	59	48	34	35	40	69	57	40
2-1/2	14	20	40	34	39	68	55	39	37	42	73	59	42	42	48	83	68	48

Rated capacities of choker hitches apply when the angle of choke is greater than 120°.

Rated capacities of basket hitches are based on a minimum diameter of curvature at the point of load contact of 25 times the rope diameter.

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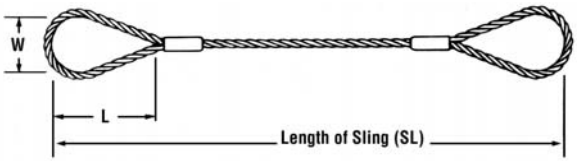
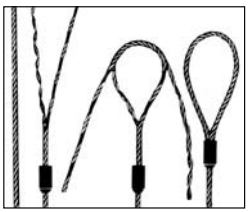
Mechanical Splice
Flemish Eye Slings

Hanes SUPPLY, INC.
YOUR SLING AND RIGGING SPECIALIST

NO. 105B

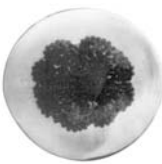
Eyes are formed using the flemish eye splice. Ends are secured by pressing a metal sleeve over the ends of the strands of the splice. Pull is directly along the centerline of rope and eye. Gives most efficient use of rope capacity and is economical.





Flemish Eye Splice

In the standard flemish eye mechanical splice, rope is separated into two parts – 3 adjacent strands, and 3 adjacent strands and core. These two parts are then re-laid back in opposite directions to form an eye, and ends are secured with a pressed metal sleeve.



Swaging Provides Positive Grip

This cutaway of a metal sleeve swaged onto a splice shows how metal "flows" into valleys between strands to positively prevent ends from unlaying when sling is used within its rated capacity.

Dia. of Rope (in)	Min. Length (SL) of Sling (ft - in)	Loop Dim. W (in)	Loop Dim. L (in)	RATED CAPACITIES (TONS)* IPS ROPE - IWRC Choker Hitch	IPS ROPE - IWRC Single Leg Vertical	IPS ROPE - IWRC BASKET HITCH 30°	IPS ROPE - IWRC BASKET HITCH 45°	IPS ROPE - IWRC BASKET HITCH 60°	EIPS ROPE - IWRC Choker Hitch	EIPS ROPE - IWRC Single Leg Vertical	EIPS ROPE - IWRC BASKET HITCH 30°	EIPS ROPE - IWRC BASKET HITCH 45°	EIPS ROPE - IWRC BASKET HITCH 60°
1/4	1 - 6	2	4	.41	.56	.97	.79	.56	.48	.65	1.1	.92	.65
3/8	2	3	6	.93	1.2	2.1	1.7	1.2	1.1	1.4	2.4	2.0	1.4
1/2	2 - 6	4	8	1.6	2.2	3.8	3.1	2.2	1.9	2.5	4.3	3.5	2.5
5/8	3	5	10	2.5	3.4	5.9	4.8	3.4	2.9	3.9	6.8	5.5	3.9
3/4	3 - 6	6	12	3.6	4.9	8.5	6.9	4.9	4.1	5.6	9.7	7.9	5.6
7/8	4	7	14	4.8	6.6	11	9.3	6.6	5.6	7.6	13	11	7.6
1	4 - 6	8	16	6.3	8.5	15	12	8.5	7.2	9.8	17	14	9.8
1-1/8	5	9	18	7.9	10	17	14	10	9.1	12	21	17	12
1-1/4	5 - 6	10	20	9.7	13	23	18	13	11	15	26	21	15
1-3/8	6	11	22	12	15	26	21	15	13	18	31	25	18
1-1/2	7	12	24	14	18	31	25	18	16	21	36	30	21
1-3/4	8	14	28	19	25	43	35	25	21	28	48	40	28
2	9	16	32	24	32	55	45	32	28	37	64	52	37
2-1/4	10	18	36	30	39	68	55	39	35	44	76	62	44
2-1/2	11	20	40	37	47	81	66	47	42	54	94	76	54
2-3/4	12	22	44	44	57	99	81	57	51	65	113	92	65
3	13	24	48	52	67	116	95	67	60	77	133	109	77
3-1/2	16 - 6	32	64	69	88	152	124	88	79	102	177	144	102
3-3/4	18	36	72	78	100	173	141	100	90	115	199	163	115
4	20	40	80	88	113	196	160	113	101	130	225	184	130
4-1/2	24	50	100	108	139	241	197	139	124	160	277	226	160

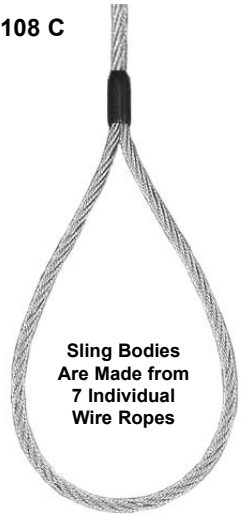
*Rated capacities of basket hitches are based on a minimum diameter of curvature at the point of load contact of 40 times the rope diameter for slings 1/4" thru 1" diameter and 25 times the rope diameter for slings 1-1/4" diameter and larger.

Inspect before use. Follow OSHA, ANSI B30.9 or Manufacturers Guidelines. Use by untrained persons is hazardous. Improper use will result in serious injury or death. Do not exceed rated capacity. This product will fail if damaged, abused, misused, overused or improperly maintained.

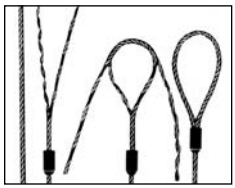
⚠ WARNING

Cable-Laid Slings

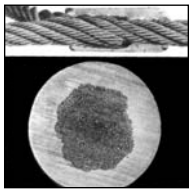
NO. 108 C



These smooth and very flexible slings are made from cut lengths of cable-laid fabric that is machine formed by laying six wire ropes in a helical pattern around a core rope. Flemish eye mechanical splices, secured by pressed metal sleeves, provide centerline pull at the eyes. More flexible than same capacity single-part slings.

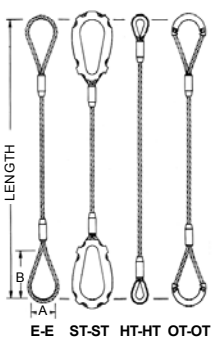


Flemish Eye Splice
In the standard flemish eye mechanical splice, rope is separated into two parts – 3 adjacent strands, and 3 adjacent strands and core. These two parts are then re-laid back in opposite directions to form an eye, and ends are secured with a pressed metal sleeve.



Swaging Provides Positive Grip
This cutaway of a metal sleeve swaged onto a splice shows how metal "flows" into valleys between strands to positively prevent ends from unlaying when sling is used within its rated capacity.

Ideal for use as basket or choker hitches, where flexibility and ease of handling are essential and cutting or abrasion is not a critical factor.

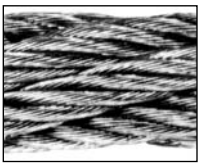


	Body Dia. (in.)	RATED CAPACITY - TONS Vert.	Choker	Basket Hitch	60°	45°	30°	Eye A	Eye B	Slip Thru Thimble ST	Heavy Thimble HT	Slip-on Thimble QT
7x7x7	1/4	.50	.34	1.0	.87	.71	.50	2	4	W-2	1/4	3/8
	3/8	1.1	.74	2.2	1.9	1.5	1.1	3	6	W-2	3/8	3/8
	1/2	1.9	1.3	3.7	3.2	2.6	1.9	4	8	W-3	1/2	1/2
	5/8	2.8	1.9	5.5	4.8	3.9	2.8	5	10	W-4	5/8	5/8
7x7x19	3/4	4.1	2.8	8.1	7.0	5.8	4.1	6	12	W-4	3/4	3/4
	7/8	5.4	3.7	11.	9.4	7.6	5.4	7	14	W-5	7/8	7/8
	1	6.9	4.7	14.	12.	9.7	6.9	8	16	W-5	1	1
	1-1/8	8.3	5.8	17.	14.	12.	8.3	9	18	W-6	1-1/8	
	1-1/4	9.9	7.0	20.	17.	14.	9.9	10	20	W-6	1-1/4	

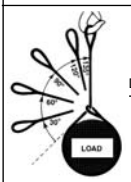
WARNING Inspect before use. Follow OSHA, ANSI B30.9 or Manufacturers Guidelines. Use by untrained persons is hazardous. Improper use will result in serious injury or death. Do not exceed rated capacity. This product will fail if damaged, abused, misused, overused or improperly maintained.

CABLE LAID GROMMET WIRE ROPE SLINGS

Cable Laid Grommets have six wire ropes laid helically around a wire rope core, with ends joined either by a hand-tucked or a mechanical splice to form an endless body. Highly flexible, they resist kinks and are easy to handle. Minimum circumference of the sling is 96 times the grommet body diameter.

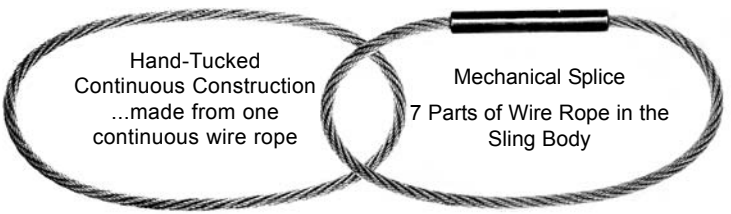


Rated Capacity Adjustment For Choker Hitches



ANGLE OF CHOKE IN DEGREES	PERCENT OF SLING RATED CAPACITY APPLICABLE
120-180	100%
90-119	87%
60-89	74%
30-59	62%
0-29	49%

When a choke is drawn down tight against a load, or a side pull is exerted resulting in an angle of less than 120 degrees, an adjustment must be made for further reduction of the sling rated capacity.



No. 21 B Rated Capacity - Tons (2,000 Lbs.)

EIP Component Rope Dia. (in.)	Finished Sling Body Dia. (in.)	Vert.	Choker	BASKET HITCHES Vertical	30°	45°	60°
7 x 7 x 7 GALVANIZED AIRCRAFT CABLE							
1/8	3/8	1.6	1.0	3.2	1.6	2.2	12.8
3/16	9/16	3.5	2.3	6.9	3.5	4.9	6.0
7/32	5/8	4.5	2.9	9.0	4.5	6.4	7.8
7 X 6 X 9 AND 7 X 6 X 37 - EIP							
1/4	3/4	5.6	3.6	11	5.6	7.9	9.7
5/16	15/16	8.7	5.6	17	8.7	12	15
3/8	1-1/8	12	8.0	25	12	17	21
7/16	1-5/16	17	11	33	17	23	29
1/2	1-1/2	21	14	43	21	30	37
9/16	1-11/16	27	17	53	27	38	46
5/8	1-7/8	33	21	66	33	46	57
3/4	2-1/4	46	30	92	46	65	80
7/8	2-5/8	62	40	123	62	87	107
1	3	79	51	158	79	112	137
1-1/8	3-3/8	98	64	196	98	138	170
1-1/4	3-3/4	119	77	237	119	168	205

No. 15 B Rated Capacity - Tons (2,000 Lbs.)

Finished Sling Body Dia. (in.)	Vert.	Choker	BASKET HITCHES Vertical	30°	45°	60°
7 x 7 x 19 CONSTRUCTION						
1/4	.83	.54	1.7	.83	1.2	1.4
3/8	1.8	1.2	3.6	1.8	2.5	3.1
1/2	3.0	2.0	6.1	3.0	4.3	5.3
5/8	4.6	3.0	9.1	4.6	6.4	7.9
7 x 6 x 19 AND 7 x 6 x 37 - EIP CONSTRUCTION						
3/4	6.2	4.1	12	6.2	8.8	11
7/8	8.3	5.4	17	8.3	12	14
1	11	6.8	21	11	15	18
1-1/8	13	8.4	26	13	18	22
1-1/4	16	10	31	16	22	27
1-3/8	18	12	37	18	26	32
1-1/2	22	14	43	22	31	38
1-5/8	25	16	50	25	36	44
1-3/4	28	18	56	28	40	49

Rated Capacities Basket Hitch and vertical lift based on D/d ratio of 5 when "d" is diameter of the finished grommet.

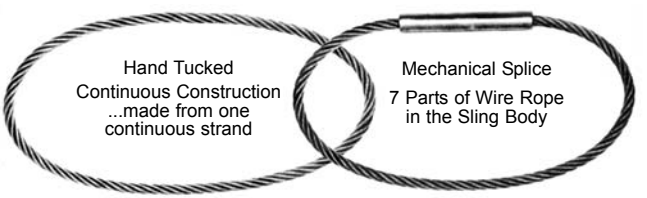
Rated Capacities based on pin diameter no smaller than 5 times the body diameter.

Rated capacities based on design factor of 5.

Sling angles of less than 30 degrees shall not be used.

STRAND LAID GROMMET WIRE ROPE SLINGS

Strand Laid Grommets have either a wire rope body, or a body of six strands laid helically around a strand core, with either a hand tucked or a mechanical splice to form an endless sling body. Minimum circumference of the sling is 96 times the grommet body diameter.



No. 11B Rated Capacity - Tons (2,000 Lbs.)

7 x 19 AND 7 x 37 CLASS - IPS						
SLING BODY DIA. (IN)	VERT.	CHOKER	BASKET HITCHES			
			VERTICAL	60⁰	45⁰	30⁰
1/4	.85	.60	1.7	1.5	1.2	.85
5/16	1.3	.93	2.7	2.3	1.9	1.3
3/8	1.9	1.3	3.8	3.3	2.7	1.9
7/16	2.6	1.8	5.2	4.5	3.6	2.6
1/2	3.3	2.3	6.7	5.8	4.7	3.3
9/16	4.2	2.9	8.4	7.3	6.0	4.2
5/8	5.2	3.6	10.	9.0	7.4	5.2
3/4	7.4	5.2	15.	13.	10.	7.4
7/8	10.	7.0	20.	17.	14.	10.
1	13	9.1	26.	22.	18.	13.
1-1/8	16.	11.	32.	28.	23.	16.
1-1/4	20.	14.	39.	34.	28.	20.
1-3/8	23.	16.	46.	40.	33.	23.
1-1/2	27.	19.	54.	47.	38.	27.
1-5/8	31.	22.	62.	54.	44.	31.
1-3/4	36.	25.	72.	62.	51.	36.
1-7/8	41.	28.	81.	70.	57.	41.
2	46.	32.	92.	79.	65.	46.
2-1/8	51.	36.	102.	88.	72.	51.
2-1/4	56.	39.	113.	98.	80.	56.
2-3/8	62.	44.	124.	108.	88.	62.
2-1/2	68.	47.	136.	117.	96.	68.
2-3/4	81.	56.	161.	140.	114.	81.
3	94.	66.	189.	163.	133.	94.

No. 14B Rated Capacity - Tons (2,000 Lbs.)

6 x 19 AND 6 x 37 CLASS - IPS - IWRC						
SLING BODY DIA. (IN)	VERT.	CHOKER	BASKET HITCHES			
			VERTICAL	60⁰	45⁰	30⁰
1/4	.92	.64	1.8	1.6	1.3	.92
5/16	1.4	1.0	2.9	2.5	2.0	1.4
3/8	2.0	1.4	4.1	3.5	2.9	2.0
7/16	2.8	1.9	5.5	4.8	3.9	2.8
1/2	3.6	2.5	7.2	6.2	5.1	3.6
9/16	4.5	3.2	9.0	7.8	6.4	4.5
5/8	5.6	3.9	11.	9.7	7.9	5.6
3/4	8.	5.6	16.	14.	11.	8.
7/8	11.	7.6	22.	19.	15.	11.
1	14.	9.8	28.	24.	20.	14.
1-1/8	18.	12.	35.	31.	25.	18.
1-1/4	22.	15.	43.	38.	31.	22.
1-3/8	26.	18.	52.	45.	37.	26.
1-1/2	31.	22.	62.	53.	44.	31.
1 -5/8	36.	25.	72.	62.	51.	36.
1-3/4	41.	29.	83.	72.	59.	41.
1-7/8	47.	33.	95.	82.	67.	47.
2	54.	38.	107.	93.	76.	54.
2-1/8	60.	42.	120.	104.	85.	60.
2-1/4	67.	47.	134.	116.	95.	67.
2-3/8	75.	52.	149.	129.	105.	75.
2-1/2	82.	57.	163.	142.	116.	82.
2-3/4	98.	69.	196.	170.	139.	98.
3	115.	81.	231.	200.	163.	115.

Rated Capacities Basket Hitch and vertical lift based on D/d ratio of 5 when "d" is diameter of the finished grommet.

Rated Capacities based on pin diamter no smaller than 5 times the body diameter.

Sling angles of less than 30 degrees shall not be used.

*See Choker Hitch Rated Capacity Adjustment chart.

2 Leg Wire Rope Bridles

Hanes SUPPLY, INC.
YOUR SLING AND RIGGING SPECIALIST

No. 200 Series

Slings are 2-leg all-purpose bridles, designed for general lifting purposes where attachment may be made directly to the load, such as hooking into lifing eyes or placing loops over lugs.

Dia. of Wire Rope (in)	Min. Length (SL) Of Sling (ft.- in.)	Rated Capacities (tons) IPS-IWRC			Alloy Oblong Links Dia. (in)	Rated Capacities (tons) EIPS-IWRC		
		60°	45°	30°		60°	45°	30°
1/4	1 - 3	.97	.79	.56	1/2	1.10	.91	.65
5/16	1 - 6	1.50	1.30	.87	1/2	1.70	1.50	1.00
3/8	1 - 8	2.10	1.80	1.20	3/4	2.50	2.00	1.40
7/16	1 - 10	3.00	2.50	1.70	3/4	3.50	2.80	2.00
1/2	2 - 0	3.80	3.10	2.20	3/4	4.40	3.60	2.50
9/16	2 - 2	4.90	4.00	2.70	1	5.60	4.60	3.10
5/8	2 - 4	5.90	4.80	3.40	1	6.80	5.50	3.90
3/4	2 - 9	8.40	6.90	4.90	1-1/4	9.70	7.90	5.60
7/8	3 - 3	11.00	9.30	6.60	1-1/4	13.00	11.00	7.60
1	3 - 6	15.00	12.00	8.50	1-1/2	17.00	14.00	9.80
1-1/8	4 - 0	18.00	15.00	10.00	1-3/4	21.00	17.00	12.00
1-1/4	4 - 6	22.00	18.00	13.00	1-3/4	26.00	21.00	15.00
1-3/8	5 - 0	27.00	22.00	15.00	2	31.00	25.00	18.00
1-1/2	5 - 6	32.00	26.00	18.00	2-1/4	36.00	30.00	21.00
1-5/8	6 - 0	38.00	31.00	20.00	2-1/2	43.00	35.00	23.00
1-3/4	6 - 6	43.00	35.00	25.00	2-1/2	49.00	40.00	28.00
2	8 - 0	55.00	45.00	32.00	2-3/4	63.00	52.00	37.00
2-1/4	8 - 9	69.00	56.00	40.00	3-1/4	79.00	65.00	46.00
2-1/2	10 - 0	84.00	68.00	48.00	3-3/4	97.00	79.00	56.00

For approximate capacities using Fibre Core IPS: deduct 10% from IPS-IWRC strengths.

For approximate capacities on Hand Braided Slings: deduct 15% from corresponding mechanically swaged strengths.

For approximate capacities on Socket Attachments: add 5% to corresponding IWRC swaged strengths.

200 FL
2 leg – Oblong Link with Heavy Duty Thimbles on Top and **Flemish Loops** on Bottom.

200 HT
2 leg – Oblong Link with Heavy Duty Thimbles on Top and **Heavy Duty Thimbles** on Bottom.

200 EH
2 leg – Oblong Link with Heavy Duty Thimbles on Top and **Eye Hoist Hooks** Safety Latches on Bottom.

200 SPA
2 leg – Oblong Link with Heavy Duty Thimbles on Top and **Screw Pin Anchor** Shackle on Bottom.

200 CT
2 leg – Oblong Link with Heavy Duty Thimbles on Top and **Crescent Thimble** on Bottom.

200 OS
2 leg – Oblong Link with Heavy Duty Thimbles on Top and **Open Swage Socket** on Bottom.

200 CS
2 leg – Oblong Link with Heavy Duty Thimbles on Top and **Closed Swage Socket** on Bottom.

200 BAS
2 leg – Oblong Link with Heavy Duty Thimbles on Top and **Bolt Anchor Shackle** on Bottom.

3 Leg Wire Rope Bridles

No. 300 Series

Slings are 3-leg all-purpose bridles, generally recommended for handling unbalanced loads.

Dia. of Wire Rope (in)	Min. Length (SL) Of Sling (ft.- in.)	Rated Capacities (tons) IPS-IWRC			Alloy Oblong Links Dia. (in)	Rated Capacities (tons) EIPS-IWRC		
		60°	45°	30°		60°	45°	30°
1/4	1 - 3	1.40	1.20	.84	1/2	1.60	1.40	.97
5/16	1 - 6	2.30	1.80	1.30	3/4	2.60	2.10	1.50
3/8	1 - 8	3.20	2.60	1.90	3/4	3.70	3.00	2.20
7/16	1 - 10	4.40	3.60	2.50	1	5.10	4.10	2.90
1/2	2 - 0	5.70	4.60	3.30	1	6.60	5.30	3.80
9/16	2 - 2	7.10	5.80	4.10	1	8.30	6.80	4.70
5/8	2 - 4	8.80	7.20	5.10	1-1/4	10.00	8.30	5.90
3/4	2 - 9	13.00	10.00	7.30	1-1/2	14.00	12.00	8.40
7/8	3 - 3	17.00	14.00	9.90	1-1/2	20.00	16.00	11.00
1	3 - 6	22.00	18.00	13.00	1-3/4	25.00	21.00	15.00
1-1/8	4 - 0	27.00	22.00	16.00	2	31.00	25.00	18.00
1-1/4	4 - 6	33.00	27.00	18.00	2-1/4	38.00	31.00	21.00
1-3/8	5 - 0	40.00	33.00	22.00	2-3/4	46.00	38.00	25.00
1-1/2	5 - 6	47.00	39.00	26.00	2-3/4	55.00	45.00	30.00
1-5/8	6 - 0	53.00	43.00	31.00	2-3/4	61.00	49.00	36.00
1-3/4	6 - 6	64.00	52.00	35.00	3	73.00	60.00	40.00
2	8 - 0	83.00	67.00	46.00	3-1/2	95.00	76.00	53.00
2-1/4	8 - 9	103.00	84.00	58.00	4	118.00	96.00	67.00
2-1/2	10 - 0	126.00	102.00	72.00	4-1/2	145.00	118.00	84.00

For approximate capacities using Fibre Core IPS: deduct 10% from IPS-IWRC strengths.

For approximate capacities on Hand Braided Slings: deduct 15% from corresponding mechanically swaged strengths.

For approximate capacities on Socket Attachments: add 5% to corresponding IWRC swaged strengths.

300 FL
3 leg – Oblong Link with Heavy Duty Thimbles on Top and **Flemish Loops** on Bottom.

300 HT
3 leg – Oblong Link with Heavy Duty Thimbles on Top and **Heavy Duty Thimbles** on Bottom.

300 EH
3 leg – Oblong Link with Heavy Duty Thimbles on Top and **Eye Hoist Hooks** Safety Latches on Bottom.

300 SPA
3 leg – Oblong Link with Heavy Duty Thimbles on Top and **Screw Pin Anchor** Shackle on Bottom.

300 CT
3 leg – Oblong Link with Heavy Duty Thimbles on Top and **Crescent Thimble** on Bottom.

300 OS
3 leg – Oblong Link with Heavy Duty Thimbles on Top and **Open Swage Socket** on Bottom.

300 CS
3 leg – Oblong Link with Heavy Duty Thimbles on Top and **Closed Swage Socket** on Bottom.

300 BAS
3 leg – Oblong Link with Heavy Duty Thimbles on Top and **Bolt Anchor Shackle** on Bottom.

4 Leg Wire Rope Bridles

Hanes SUPPLY, INC.
YOUR SLING AND RIGGING SPECIALIST

No. 400 Series

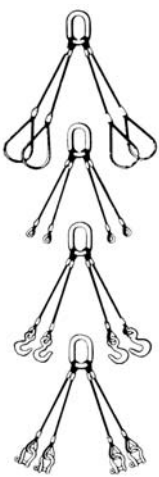
Slings are 4-leg all-purpose bridles, used both for balanced & unbalanced loads and for heavier loads where design calls for more distribution of weight by the use of attachment at four points.

Dia. of Wire Rope (in)	Min. Length (SL) Of Sling (ft.- in.)	Rated Capacities (tons) IPS-IWRC			Alloy Oblong Links Dia. (in)	Rated Capacities (tons) EIPS-IWRC		
		60°	45°	30°		60°	45°	30°
1/4	1 - 3	1.90	1.60	1.10	1/2	2.20	1.80	1.30
5/16	1 - 6	3.00	2.50	1.70	3/4	3.50	2.80	2.00
3/8	1 - 8	4.30	3.50	2.40	1.	5.00	4.00	2.80
7/16	1 - 10	5.80	4.80	3.40	1	6.70	5.50	4.00
1/2	2 - 0	7.60	6.20	4.40	1-1/4	8.70	7.10	5.00
9/16	2 - 2	9.50	7.80	5.40	1-1/4	11.00	9.00	6.20
5/8	2 - 4	12.00	9.60	6.80	1-1/4	13.00	11.00	7.80
3/4	2 - 9	17.00	14.00	9.80	1-3/4	18.00	16.00	11.00
7/8	3 - 3	23.00	18.00	13.00	1-3/4	26.00	21.00	15.00
1	3 - 6	29.00	24.00	17.00	2-1/4	34.00	28.00	20.00
1-1/8	4 - 0	36.00	29.00	20.00	2-3/4	42.00	34.00	24.00
1-1/4	4 - 6	44.00	26.00	26.00	2-3/4	51.00	42.00	30.00
1-3/8	5 - 0	53.00	44.00	30.00	3-1/4	61.00	50.00	36.00
1-1/2	5 - 6	63.00	52.00	36.00	3-3/4	73.00	60.00	42.00
1-5/8	6 - 0	74.00	61.00	40.00	3-3/4	85.00	70.00	46.00
1-3/4	6 - 6	85.00	69.00	50.00	4-1/2	98.00	80.00	56.00
2	8 - 0	110.00	90.00	64.00	4-1/2	126.00	104.00	74.00
2-1/4	8 - 9	138.00	112.00	80.00	Call	158.00	130.00	92.00
2-1/2	10 - 0	168.00	136.00	96.00	Call	194.00	158.00	112.00

For approximate capacities using Fibre Core IPS: deduct 10% from IPS-IWRC strengths.

For approximate capacities on Hand Braided Slings: deduct 15% from corresponding mechanically swaged strengths.

For approximate capacities on Socket Attachments: add 5% to corresponding IWRC swaged strengths.



400 FL
4 leg – Oblong Link with Heavy Duty Thimbles on Top and **Flemish Loops** on Bottom.

400 HT
4 leg – Oblong Link with Heavy Duty Thimbles on Top and **Heavy Duty Thimbles** on Bottom.

400 EH
4 leg – Oblong Link with Heavy Duty Thimbles on Top and **Eye Hoist Hooks** Safety Latches on Bottom.

400 SPA
4 leg – Oblong Link with Heavy Duty Thimbles on Top and **Screw Pin Anchor** Shackle on Bottom.

400 CT
4 leg – Oblong Link with Heavy Duty Thimbles on Top and **Crescent Thimble** on Bottom.

400 OS
4 leg – Oblong Link with Heavy Duty Thimbles on Top and **Open Swage Socket** on Bottom.

400 CS
4 leg – Oblong Link with Heavy Duty Thimbles on Top and **Closed Swage Socket** on Bottom.

400 BAS
4 leg – Oblong Link with Heavy Duty Thimbles on Top and **Bolt Anchor Shackle** on Bottom.

Wire Rope Bridle End Fittings
Chain Specifications

PERTINENT DIMENSIONS FOR END FITTINGS FOR NO. 200, 300 & 400 SERIES SLINGS

Diam. Of Wire Rope (in)	Standard Loop Inside W (in)	Standard Loop Inside L (in)	Heavy Duty Thimble Inside W (in)	Heavy Duty Thimble Inside L (in)	Alloy Hook Size (tons) IPS & EIPS	Carbon Shackle Size (in) For IPS	Carbon Shackle Size (in) For EIPS	Half Thimble Inside Loop Size (tons) W (in)	Half Thimble Inside Loop Size (tons) L (in)	Open Swage Socket Pin. Dia. (in)	Open Swage Socket Jaw Opening (in)	Closed Swage Socket Hole. Dia. (in)	Closed Swage Socket Head Thickness (in)
6 x 19 WITH IWRC													
1/4	2	4	7/8	1-5/8	1	5/16	5/16	–	–	11/16	11/16	3/4	1/2
5/16	2-1/2	5	1-1/16	1-7/8	1	3/8	3/8	–	–	13/16	13/16	7/8	11/16
3/8	3	6	1-1/8	2-1/8	1-1/2	7/16	7/16	2	4	13/16	13/16	7/8	11/16
7/16	3-1/2	7	1-1/4	2-3/8	2	1/2	1/2	2-1/4	5	1	1	1-1/16	7/8
1/2	4	8	1-1/2	2-3/4	3	5/8	5/8	2-1/4	5-1/2	1	1	1-1/16	7/8
9/16	4-1/2	9	1-1/2	2-3/4	5	5/8	5/8	2-1/4	5-1/2	1-3/16	1-1/4	1-1/4	1-1/8
5/8	5	10	1-3/4	3-1/4	5	3/4	3/4	3-1/4	7	1-3/16	1-1/4	1-1/4	1-1/8
3/4	6	12	2	3-3/4	7	7/8	7/8	3-1/4	9	1-3/8	1-1/2	1-7/16	1-5/16
7/8	7	14	2-1/4	4-1/4	11	1	1	4-1/2	10-1/2	1-5/8	1-3/4	1-11/16	1-1/2
1	8	16	2-1/2	4-1/2	11	1-1/8	1-1/4	4-1/2	12	2	2	2-1/16	1-3/4
1-1/8	9	18	2-7/8	5-1/8	15	1-1/4	1-1/4	4-5/8	13-1/2	2-1/4	2-1/4	2-5/16	2
6 x 37 WITH IWRC													
1-1/4	10	20	2-7/8	5-1/8	15	1-3/8	1-1/2	5-1/2	15	2-1/2	2-1/2	2-9/16	2-1/4
1-3/8	11	22	3-1/2	6-1/4	22	1-1/2	1-3/4	6	17	2-1/2	2-1/2	2-9/16	2-1/4
1-1/2	12	24	3-1/2	6-1/4	22	1-3/4	1-3/4	6-1/2	18	2-3/4	3	2-13/16	2-1/2
1-5/8	13	26	4	8	30	1-3/4	1-3/4	6-1/2	18	3-1/2	3-1/2	3-9/16	3
1-3/4	14	28	4-1/2	9	30	1-3/4	2	7	21-1/2	3-1/2	3-1/2	3-9/16	3
2	16	32	6	12	37	2	2-1/2	7	24-1/2	3-3/4	4	3-13/16	3-1/4
2-1/4	18	36	7	14	45	2-1/2	2-1/2	8-1/2	25-1/2	4-1/4	4-1/4	4-5/16	4
2-1/2	20	40	–	–	60	2-1/2	3	8-1/2	26-1/2	4-1/4	4-1/4	4-5/16	4
2-3/4	22	44	–	–	–	3	3	10	30	–	–	–	–
3	24	48	–	–	–	3	3	10	32	–	–	–	–
3-1/4	–	–	–	–	–	3	3-1/2	–	–	–	–	–	–
3-1/2	–	–	–	–	–	3-1/2	3-1/2	–	–	–	–	–	–
3-3/4	–	–	–	–	–	3-1/2	4	–	–	–	–	–	–
4	–	–	–	–	–	4	4	–	–	–	–	–	–

CHAIN SPECIFICATIONS

CM GRADE 30 PROOF COIL CHAIN

Low carbon steel utility chain with a wide range of general purpose uses. Self-colored finish. Links embossed every 10 inches with date code and grade appearing alternately. Also available in Hot Galvanized or Bright Zinc finish.

CM GRADE 43 HIGH TEST CHAIN

Made from a selected analysis carbon steel to provide higher tensile strength and working load limits, as well as better resistance to wear. Bright (polished) finish. Links embossed every 10 inches with date code and grade appearing alternately. Also available in Hot Galvanized or Bright Zinc finish.

CM GRADE GRADE 70 TRANSPORT (BINDING) CHAIN

Significantly higher tensile strength for all load binding and tie down applications, which permits you to hold a given load with the next smaller size chain than Grade 43. This increased strength-to-weight ratio means lower costs and a lighter chain, for easier storage and handling. Gold finish. Links embossed every 10 inches with date code and grade appearing alternately.

CHAIN SIZE INCHES	CHAIN SIZE DECIMAL	WORKING LOAD LIMIT (LBS)*	NOMINAL INSIDE LINK DIMENSIONS (IN.) LENGTH	NOMINAL INSIDE LINK DIMENSIONS (IN.) WIDTH	WGT. PER 100 FT (LBS)
3/16	.218	800	.95	.40	38
1/4	.276	1,300	1.00	.47	66
5/16	.327	1,900	1.10	.50	98
3/8	.390	2,650	1.23	.62	144
7/16	.468	3,700	1.37	.75	210
1/2	.531	4,500	1.50	.81	278
5/8	.656	6,900	1.87	1.00	422
3/4	.787	10,600	2.12	1.12	628
1	1.031	17,900	2.75	1.50	1,069
1/4	.281	2,600	1.00	.47	71
5/16	.327	3,900	1.10	.50	98
3/8	.390	5,400	1.23	.62	144
7/16	.468	7,200	1.37	.75	210
1/2	.531	9,200	1.50	.81	278
5/8	.656	13,000	1.87	1.00	422
3/4	.781	20,200	2.12	1.12	606
7/8	.875	24,500	2.25	1.14	776
1	1.000	34,100	2.75	1.50	1,050
1/4	.281	3,150	.84	.47	74
5/16	.327	4,700	.98	.46	100
3/8	.406	6,600	1.14	.54	156
7/16	.468	8,750	1.33	.62	204
1/2	.531	11,300	1.43	.72	259

***WARNING!** DO NOT EXCEED WORKING LOAD LIMIT.

BINDER CHAIN ASSEMBLIES AVAILABLE IN GRADE 43, 70 & 80 AND A VARIETY OF SIZES AND LENGTHS

CM GRADE 80 CHAIN SLING ASSEMBLY

BASIC TYPES OF CHAIN SLINGS

Basic types of chain slings are dsignated throughout the industry by the following symbols:

First Symbol (basic type):

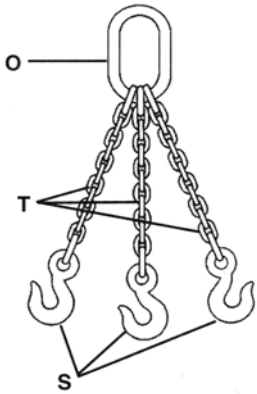
S - Single chain sling with master link and hook, or hook at each end.
C - Choker chain sling with master link on each end; no hooks.
D - Double chain sling with standard master link and hooks.
T - Triple chain sling with standard master link and hooks
Q - Quadruple chain sling with master link and hooks.

Second Symbol (type of master link or end link):

O - Oblong master link – Recommended standard for all types.
P - Pear shaped master link – Available on request.

Third Symbol (type of hook):

S - Sling hook
F - Foundry hook
G - Grab hook
L - Latchlok hook



Type TOS

Sling tags are coded with numerals 1 through 4 to reflect number of branches in sling. Additional coding is defined as follows:

AS - Adjustable sling
ES - Endless single
SAL - Single adjustable loop
AD - Adjustable double
SB - Single Basket
ED - Endless double
DAL - Double adjustable loop
DB - Double basket

HOW TO SELECT & ORDER THE PROPER CHAIN SLING

1. Determine the weight and configuration of the load(s) to be lifted.

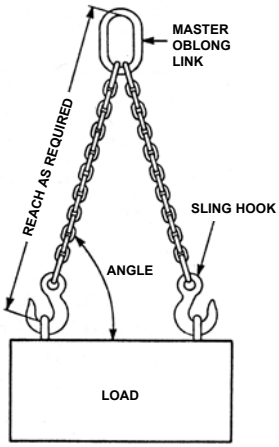
2. Determine the type of chain sling required, according to weight and configuration. (refer to the following pages)

3. Determine the size of the body chain according to the working load limits. Be sure to take into consideration the effect of the required angle.
*Working load limit: The working load limit is the maximum load in pounds which should ever be applied to chain, even when chain is new, and when load is uniformly applied in direct tension to a straight length of chain.

4. Determine the reach required to give the desired angle. The reach is measured from the upper bearing surface of the master link to the bearing surface of the lower attachment. If chain slings are to be used in pairs and are to be matched for reach, please indicate when ordering.

5. Be sure to specify type, size and reach when ordering chain slings. For specifications on additional hooks, attachments and accessories, refer to the following pages.

Note: Angle to the load on multiple leg slings will be 60° or greater as long as the distance between lifting eyes of load is NOT greater than reach shown on Identification Tag.



CM HERC-ALLOY 800® SINGLE CHAIN SLINGS

A higher strength heat treated alloy steel chain, CM grade 80 Herc-Alloy 800 chain is primarily used as a sling component for overhead lifting, but can be used in rigging and tie down applications where a lighter weight high strength chain is desirable. Recommended for overhead lifting by NACM, ANSI, & OSHA.

CM grade 80 Herc-Alloy 800 chain slings and attachments are manufactured from special analysis alloy steel, engineered for a superior combination of strength, lightness and durability.

All Herc-Alloy 800 chain and attachments are black finish and/or color coded orange for easy, permanent identification. The chain is embossed with the grade (HA-800) and trace code.

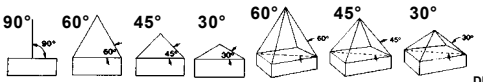
Before shipment, all CM Herc-Alloy 800 chain slings undergo a succession of demanding quality control checks. Every sling is proof tested, registered and guaranteed for one year to be free from defects in materials and workmanship. A durable metal tag attached to the sling permanently identifies the grade, type, working load limit (at a specific angle of lift) and registration number of the sling.

Chain slings are used primarily for overhead lifting and are generally used in conjunction with a crane or some type of lifting device. Standard sling configurations consist of chain branches which are affixed on one end to a master link or ring with some type of attachment, usually a hook, affixed to the opposite end.

HERC-ALLOY 800® CHAIN AND ATTACHMENTS CONVERSION TABLE

CHAIN SIZE			HOOK SIZE DESIGNATION AND MARKINGS				
Fraction (in)	Decimal (in)	Metric (mm)	Sling	Cradle Grab*	Flat Grab	Foundry	Latchlok
7/32	.218	5.5	HA22	10 M	10M	–	–
9/32	.281	7.0	HA220	HA 9/32	HA1	HA498	9/32
3/8	.394	10.0	HA250	HA 3/8	HA3	HA499	3/8
1/2	.512	13.0	HA280	HA 1/2	HA5	HA500	1/2
5/8	.630	16.0	HA290	HA 5/8	HA6	HA501	5/8
3/4	.787	20.0	HA300	HA 3/4	HA7	HA502	3/4
7/8	.875	22.0	HA320	HA 7/8	HA8	HA503	–
1	1.024	26.0	HA330	HA 1	HA9	HA504	–
1-1/4	1.260	32.0	HA350	HA 1-1/4	HA11	HA505	–

CM HERC-ALLOY 800® CHAIN SIZES AND WORKING LOAD LIMITS



CHAIN SIZE		PRODUCT	WORKING LOAD LIMITS (LBS)							NOMINAL DIMENSIONS (IN)		APPROX. NO. LINKS	APPROX. WEIGHT
			SINGLE	DOUBLE			TRIPLE & QUAD						
(IN)	(MM)	CODE	90°	60°	45°	30°	60°	45°	30°	INSIDE LENGTH	INSIDE WIDTH	PER FT.	PER 100FT. (LBS)
7/32	5.5	607020	2,100	3,600	3,000	2,100	5,450	4,450	3,150	.671	.296	17.9	44.7
9/32	7.0	607028	3,500	6,100	4,900	3,500	9,100	7,400	5,200	.868	.395	13.8	74.2
3/8	10.0	607037	7,100	12,300	10,000	7,100	18,400	15,100	10,600	1.222	.572	9.8	145.9
1/2	13.0	607050	12,000	20,800	17,000	12,000	31,200	25,500	18,000	1.101	.720	8.5	257.7
5/8	16.0	607062	18,100	31,300	25,600	18,100	47,000	38,400	27,100	1.733	.854	6.9	387.3
3/4	20.0	607075	28,300	49,000	40,000	28,300	73,500	60,000	42,400	2.160	1.052	5.5	622.0
7/8	22.0	607087	34,200	59,200	48,400	34,200	88,900	72,500	51,300	2.250	1.137	5.3	776.4
1	26.0	607101	47,700	82,600	67,400	47,700	123,900	101,200	71,500	2.664	1.348	4.5	995.4
1-1/4	32.0	607128	72,300	125,200	102,200	72,300	187,800	153,400	108,400	3.250	1.656	3.7	1,570.9

CARE, USE AND INSPECTION

The life and strength of CM Herc-Alloy 800 chain slings depends on proper inspection, maintenance and use. For additional information, refer to ANSI B30.9 and OSHA 1920.184.

CARE

Chain requires careful storage and regular maintenance.
- Store chains on an A frame in a clean, dry place.
- To avoid corrosion, oil chaines before prolonged storage.
- Do not heat CM Herc-Alloy 800 chain; this will alter its thermal treatment
- Do not plate or change surface finish of chain. Contact CM for special requirements.

USE

To protect both operators and materials, observe these precautions when using chain slings:
- Before use, inspect chain and attachments following the instructions under "Inspection" below.
- Do not exceed working load limit. Any of the factors listed here can reduce the load the chain will hold:
  - Acceleration in rate of load to application – can produce dangerous overloading.
  - Variation in the angle of the load to the sling – as the angle decreases, the working load of the sling will increase.
  - Twisting, knotting or kinking – subjects links to unusual loading, decreasing the working load of the sling.
  - Use for purposes other than those for which slings are intended – can reduce the working load of the sling.
- Free chain of all twists, knots and kinks.
- Center load in hook(s); hook latches must not support load.
- Avoid sudden jerks when lifting and lowering.
- Balance all loads; avoid tipping of loads.
- Use pads around sharp corners.
- Do not drop load on chains.
- Match the size and working load limit of attachments such as hooks or rings to the size and working load limit of the chain.
- For overhead lifting, use only alloy chain and attachments (grade 80).

INSPECTION

It is important both to inspect chain slings regularly and to keep a record of all chain inspections. Follow this guide for such an inspection system.
- Before inspecting, clean chains with a non-acid/non-causic solvent so that marks, nicks, wear and other defects are visible.
- Inspect each link for these conditions:
  - Twists or bends.
  - Nicks or gouges.
  - Excessive wear at bearing points.
  - Stretch.
  - Distorted or damaged master links, coupling links or attachments, especially spread in throat opening of hooks.
- Mark plainly with paint each link or attachment showing any of the conditions listed here to indicate rejection; remove from service until properly repaired.

WEAR ALLOWANCES OF CM HERC-ALLOY 800 CHAIN

Measure cross section at link ends to determine wear. If chain is worn to less than the minimum allowable thickness, remove from service.

MM	Inches	Maximum Allowable Wear (inches)	Minimum Thickness Allowable at Link Ends (inches)*
5.5	7/32	–	11/64 (.171)
7.0	9/32	3/64 (.046)	13/64 (.203)
10.0	3/8	5/64 (.078)	18/64 (.281)
13.0	1/2	7/64 (.109)	22/64 (.343)
16.0	5/8	9/64 (.140)	27/64 (.421)
20.0	3/4	10/64 (.156)	34/64 (.531)
22.0	7/8	11/64 (.171)	40/64 (3625)
26.0	1	12/64 (.187)	47/64 (.734)
32.0	1-1/4	16/64 (.250)	58/64 (.906)

*Applies to CM Herc-Alloy 800 chain only.

USE OF CHAIN UNDER HEAT CONDITIONS

When the chain itself is heated to temperatures shown here, working load limits should be reduced as indicated.

Temperature of Chain	Reduction in Working Load Limit[1] While Heated	Permanent Reduction In Working Load Limit[2]
500°F	none	none
600°F	10%	none
700°F	20%	none
800°F	30%	none
900°F	40%	10%
1000°F	50%	15%

[1]While chain is at temperature shown in first column.
[2]When chain is used at room temperature after having been heated to temperatures shown in first column.

CERTIFICATE OF TEST AND IDENTIFICATION

The identification tag found on the master coupling link of each chain sling contains this information:
- Grade
- Size
- Reach
- Type
- Working load limit (at a specific angle of lift)
- Serial number

CM CHAIN INSPECTION PROGRAMS

CM provides chain users with a wide range of informative materials and instructive programs on chain and chain inspection. Our coloful chain safety proster/chart and our fact-filled booklet. "CM Lifting, Pulling & Binding Products Manual PMC-10," are available on request.

CM Chain Clinics on proper chain use, care and inspection are conducted at our headquarters in Amherst, New York, and in plants across the country. Video cassette training programs, slide and film presentations and in-plant chain sling inspections are also available.

CM education programs are designed to promote the proper use of all CM products, and to assist users in complying with OSHA regulations.

Hanes SUPPLY, INC.
YOUR SLING AND RIGGING SPECIALIST

Chain Sling Specifications

SINGLE CHAIN SLINGS

TYPE SOG GRAB HOOK | TYPE SOG CLEVLOCK GRAB HOOK | TYPE SOS CLEVLOCK SLING HOOK | TYPE SOF FOUNDRY HOOK | TYPE SOS SLING HOOK | TYPE SOL LATCHLOK HOOK

DOUBLE CHAIN SLINGS

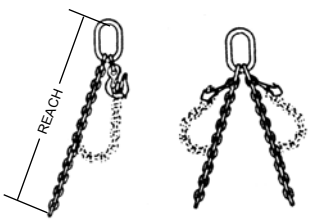
SINGLE BASKET | TYPE DOS CLEVLOK SLING HOOK | TYPE DOG CLEVLOK GRAB HOOK | TYPE DOF FOUNDRY HOOK | TYPE DOS | TYPE DOG GRAB HOOK

TRIPLE & QUAD CHAIN SLINGS

TYPE TOS | TYPE OOS | DOUBLE BASKET

SINGLE ADJUSTABLE LOOP CHAIN SLING

DOUBLE ADJUSTABLE LOOP CHAIN SLING



SINGLE ADJUSTABLE LOOP - STYLE A | DOUBLE ADJUSTABLE LOOP - STYLE A

Chain Sling Saddle Rings

Hanes SUPPLY, INC.
YOUR SLING AND RIGGING SPECIALIST

ALLOWS ADJUSTMENT OF CHAIN REACH

United States Patent #4,241,575
Canadian Patent #1,086,510 British Patent #2,029,370

SAME STRENGTH AS STANDARD CHAIN SLINGS, ONLY MORE ECONOMICAL

SYSTEM	CHAIN SIZE INCHES	SINGLE BRANCH SLING 90 DEGREE LOADING	DOUBLE SLING 60°	DOUBLE SLING 45°	DOUBLE SLING 30°
10	9/32	4,300	7,500	6,100	4,300
10	3/8	8,800	15,200	12,400	8,800
10	1/2	15,000	26,000	21,200	15,000
10	5/8	22,600	39,000	32,000	22,000
10	3/4	35,300	61,100	49,900	35,300
10	7/8	42,700	74,000	60,400	42,700
8	1	47,700	82,600	67,400	47,700
8	1-1/4	72,300	125,200	102,200	72,300
8	1-1/2	80,000	138,600	113,100	80,000

CHAIN SIZE INCHES	TRIPLE AND QUADRUPLE SLING 60°	45°	30°
9/32	11,200	9,100	6,450
3/8	22,800	18,600	13,200
1/2	39,000	31,800	22,500
5/8	58,700	47,900	33,900
3/4	91,700	74,900	53,000
7/8	110,900	90,600	64,000
1	123,900	101,200	71,500
1-1/4	187,800	153,400	108,400
1-1/2	—	—	—

CM GRADE 80 SINGLE CHAIN SLING TYPE S & C

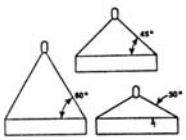
WORKING CHAIN SIZE (IN.)	(MM)	WORKING LOAD LIMIT (LBS)*	OBLONG MASTER LINK DIAMETER LINK NUMBER	DIMENSIONS (INCHES) DIAMETER MATERIAL A	INSIDE WIDTH B	INSIDE LENGTH C	APPROX. WT. (LBS) TYPE SOS 5 FT. REACH
7/32	5.5	2,100	HA40	13/32	1-1/2	3	4
9/32	7	3,500	HA50	1/2	2-1/2	5	5
3/8	10	7,100	HA75	3/4	2-3/4	5-1/2	10
1/2	13	12,000	HA100	1	3-1/2	7	18
5/8	16	18,100	HA100	1	3-1/2	7	25
3/4	20	28,300	HA125	1-1/4	4-3/8	8-3/4	38
7/8	22	34,200	HA150	1-1/2	5-1/4	10-1/2	54
1	26	47,700	HA175	1-3/4	6	12	76
1-1/4	32	72,300	HA200	2	7	14	116

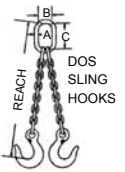
CM GRADE 100 SINGLE CHAIN SLING TYPE S & C

WORKING CHAIN SIZE (IN.)	(MM)	WORKING LOAD LIMIT (LBS)*	OBLONG MASTER LINK DIAMETER LINK NUMBER	DIMENSIONS (INCHES) DIAMETER MATERIAL A	INSIDE WIDTH B	INSIDE LENGTH C	APPROX. WT. (LBS) TYPE SOS 5 FT. REACH
7/32	5.5	2,700	HA40	13/32	1-1/2	3	4
9/32	7	4,300	HA50	1/2	2-1/2	5	5
3/8	10	8,800	HA75	3/4	2-3/4	5-1/2	10
1/2	13	15,000	HA100	1	3-1/2	7	18
5/8	16	22,600	HA100	1	3-1/2	7	25
3/4	20	35,300	HA125	1-1/4	4-3/8	8-3/4	38

WARNING Inspect before use. Follow OSHA, ANSI B30.9 or Manufacturers Guidelines. Use by untrained persons is hazardous. Improper use will result in serious injury or death. Do not exceed rated capacity. This product will fail if damaged, abused, misused, overused or improperly maintained.

DOUBLE CHAIN SLING TYPE D

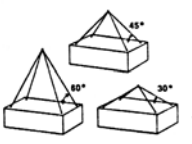


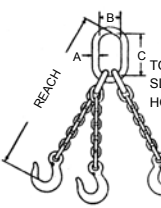


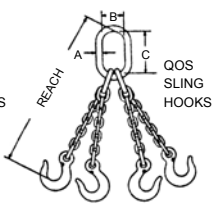
CHAIN SIZE		WORKING LOAD LIMIT (LBS)			OBLONG MASTER LINK				APPROX WT. (LBS.)
						DIMENSIONS (IN)			
(IN)	(MM)	60°	45°	30°	MASTER LINK NO.	DIA. MATERIAL A	INSIDE WIDTH B	INSIDE LENGTH C	TYPE DOS 5' REACH
7/32	5.5	3,600	3,000	2,100	HA40	13/32	1-1/2	3	8
9/32	7	6,100	4,900	3,500	HA50	1/2	2-1/2	5	9
3/8	10	12,300	10,000	7,100	HA75	3/4	2-3/4	5-1/2	18
1/2	13	20,800	17,000	12,000	HA100	1	3-1/2	7	31
5/8	16	31,300	25,600	18,100	HA125	1-1/4	4-3/8	8-3/4	49
3/4	20	49,000	40,000	28,300	HA150	1-1/2	5-1/4	10-1/2	71
7/8	22	59,200	48,400	34,200	HA175	1-3/4	6	12	98
1	26	82,600	67,400	47,700	HA200	2	7	14	132
1-1/4	32	125,200	102,200	72,300	HA225	2-1/4	8	16	221

TRIPLE & QUAD CHAIN SLING TYPE T & Q

Safety note: A quad branch chain sling usually does not sustain loads with even distribution to its four branches, especially when loads are of rigid structure. Therefore, maximum working load limits are set at the same values as for triple branch chain slings of equal quality and size and used with branches at the same angle of inclination.

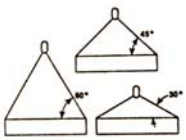






CHAIN SIZE		WLL (LBS)*			OBLONG MASTER LINK SUB-ASSEMBLY				APPROX. WT. (LBS)	
					MASTER LINK SUB ASSEMBLY NO.	DIMENSIONS (IN)				
						DIA. MATERIAL A	INSIDE WIDTH B	INSIDE LENGTH C	TYPE TOS REACH	TYPE QOS 5' REACH
(IN)	(MM)	60°	45°	30°						
7/32	5.5	5,450	4,450	3,150	HA50-SA	1/2	2-1/2	5	12	16
9/32	7	9,100	7,400	5,200	HA75-SA	3/4	2-3/4	5-1/2	14	18
3/8	10	18,400	15,100	10,600	HA100-SA	1	3-1/2	7	28	36
1/2	13	31,200	25,500	18,000	HA125-SA	1-1/4	4-3/8	8-3/4	50	62
5/8	16	47,000	38,400	27,100	HA150-SA	1-1/2	5-1/4	10-1/2	79	97
3/4	20	73,500	60,000	42,400	HA175-SA	1-3/4	6	12	112	137
7/8	22	88,900	72,500	51,300	HA200-SA	2	7	14	155	188
1	26	123,900	101,200	71,500	HA225-SA	2-1/4	8	16	215	260
1-1/4	32	187,800	153,400	108,400	HA275-SA	2-3/4	9	16	348	421

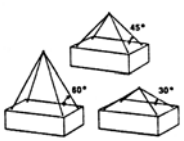
DOUBLE CHAIN SLING TYPE D

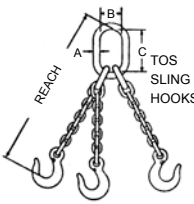


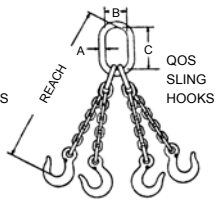
CHAIN SIZE		WORKING LOAD LIMIT (LBS)			OBLONG MASTER LINK				APPROX WT. (LBS.) TYPE DOS 5' REACH
						DIMENSIONS (IN)			
(IN)	(MM)	60°	45°	30°	PRODUCT CODE	DIA. MATERIAL A	INSIDE WIDTH B	INSIDE LENGTH C	
7/32	5.5	4,700	3,800	2,700	555231	13/32	1-1/2	3	8
9/32	7	7,400	6,100	4,300	555232	1/2	2-1/2	5	9
3/8	10	15,200	12,400	8,800	555235	3/4	2-3/4	5-1/2	18
1/2	13	26,000	21,200	15,000	555238	1	3-1/2	7	31
5/8	16	39,100	32,000	22,600	555240	1-1/4	4-3/8	8-3/4	49
3/4	20	61,100	49,900	35,300	555243	1-1/2	5-1/4	10-1/2	71

TRIPLE & QUAD CHAIN SLING TYPE T & Q

Safety note: A quad branch chain sling usually does not sustain loads with even distribution to its four branches, especially when loads are of rigid structure. Therefore, maximum working load limits are set at the same values as for triple branch chain slings of equal quality and size and used with branches at the same angle of inclination.







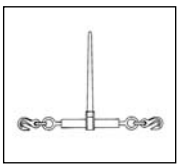
CHAIN SIZE		WLL (LBS)*			OBLONG MASTER LINK SUB-ASSEMBLY				APPROX. WT. (LBS)	
					MASTER LINK SUB ASSEMBLY NO.	DIMENSIONS (IN)				
(IN)	(MM)	60°	45°	30°		DIA. MATERIAL A	INSIDE WIDTH B	INSIDE LENGTH C	TYPE TOS 5' REACH	TYPE QOS 5' REACH
7/32	5.5	7,000	5,700	4,000	HA50-SA	1/2	2-1/2	5	12	16
9/32	7	11,200	9,100	6,400	HA75-SA	3/4	2-3/4	5-1/2	14	18
3/8	10	22,900	18,700	13,200	HA100-SA	1	3-1/2	7	28	36
1/2	13	39,000	31,800	22,500	HA125-SA	1-1/4	4-3/8	8-3/4	50	62
5/8	16	58,700	47,900	33,900	HA150-SA	1-1/2	5-1/4	10-1/2	79	97
3/4	20	91,700	74,900	53,000	HA175-SA	1-3/4	6	12	112	137

LOAD BINDER WARNINGS AND APPLICATION INSTRUCTIONS

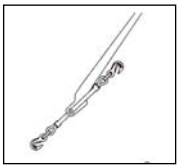
LOAD BINDER WARNINGS AND APPLICATION INSTRUCTIONS

⚠WARNING

- **Failure to use this load binder properly may result in serious injury or even death**
- **Do not operate load binder while standlng on the load.**
- **Move handle with caution. It may whip – Keep body clear.**
- **Keep yourself out of the path of the moving handle.**
- **You must be familiar with state and federal regulations regarding size and number of chain systems required for securing loads on trucks.**
- **Always consider the safety of nearby workers as well as yourself when using load binder.**
- **While under tension, load binder must not bear against any object.**
- **Do not thow these instructions away. Keep them close at hand and share them with any others who use this load binder.**



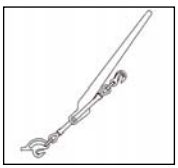
RATCHET TYPE



LEVER TYPE

LEVER SNUBBING TYPE

LEVER WALKING TYPE



LEVER RELEASING TYPE

Mechanical Advantage
Lever Type Binder = 25 : 1
Ratchet Type Binder = 50 : 1

Example: 100 pounds of effort applied to the binder results in the following force on the binder.

Lever Type:
2500 (100 lbs. x 25) lbs. of force

Ratchet Type:
5000 (100 lbs. x 50) lbs. of force

INSTRUCTIONS - LEVER TYPE LOAD BINDERS

- Hook load binder to chain so you can operate it while standing on the ground. Position load binder so its handle can be pulled downward to tighten chain (see photo). **Be aware of ice, snow rain, oil, etc. that can affect your footing. Make certain your footing is secure.**
- The Crosby Group, Inc. specifically recommends AGAINST the use of a handle extender (cheater pipe). If sufficient leverage cannot be obtained using the lever type load binder by itself, a ratchet type binder should be used.
- If the above recommendation is disregarded and a cheater pipe is used, it must closely fit the handle and must slide down the handle until the handle projections are contacted. The pipe should be secured to the handle, for example, by a pin, so that the pipe cannot fly off the handle if you lose control and let go. The increased leverage, by using a cheater pipe, can cause deformation and failure of the chain and load binder.
- During and after tightening chain, check load binder handle position. **Be sure** it is in the locked position and that its bottom side touches the chain link.
- Chain tension may decrease due to load shifting during transport. To be sure the load binder remains in proper position: Secure handle to chain by wrapping the loose end of chain around the handle and the tight chain, or tie handle to chain with soft wire.
- When releasing load binder, remember there is a great deal of energy in the stretched chain. This will cause the load binder handle to move very quickly with great force when it is unlatched. **Move handle with caution. It may whip – Keep body clear.**
- **Never use a cheater pipe or handle extender to release handle.** Use a steel bar and pry under the handle and **stay out of the path of handle** as it moves upward.
- If you release the handle by hand, use an open hand under the handle and push upward. **Do not close your hand around the handle. Always keep yourself out of the path of the moving handle.**

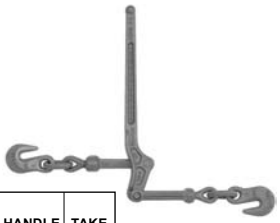
INSTRUCTIONS - RATCHET LOAD BINDERS

- Position ratchet binder so it can be operated from the ground.
- **Make sure your footing is secure.**

MAINTENANCE OF ALL LOAD BINDERS

- Routinely check load binders for wear, bending, cracks, nicks, or gouges. **If bending or cracks are present – Do not use load binder.**
- Routinely lubricate pivot and swivel points of Lever Binders, and pawl part and screw threads of Ratchet Binders to extend product life and reduce friction wear.

STANDARD LEVER TYPE LOAD BINDERS
L-150



- Forged Steel–Quenched & Tempered.
- Binder toggles away from the load.

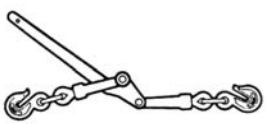
MODEL	STOCK NO.	STD. PKG.	MIN-MAX CHAIN SIZE (IN.)	WORKING LOAD LIMIT (LBS.)	PROOF LOAD (LBS.)	MINIMUM ULTIMATE STRENGTH (LBS.)	WEIGHT EACH (LBS.)	HANDLE LENGTH (IN.)	TAKE UP (IN.)
7-1	1048128	4	5/16-3/8	5400	10800	19000	7.02	16.00	4.50
A-1	1048146	4	3/8-1/2	9200	18400	33000	12.47	18.69	4.50
C-1	1048164	4	1/2-5/8	13000	26000	46000	19.68	21.00	4.75

CM RATCHET TYPE LOAD BINDER

- Heavy duty, rigid, all steel construction.
- Short reach hooks for maximum take-up.
- Infinite adjustment.
- Continuous take-up.
- Meets DOT and CVSA specifications.

MAX SIZE (IN.)	WORKING LOAD LIMIT (LBS.)	PRODUCT CODE	UPC 43927-	TAKE-UP (IN.)	APPROX. WEIGHT EACH (LBS.)
3/8 G80, G43 5/8 G70	7,100	D48360	81767-48360	8	13
1/2 G70 5/8 G43	13,000	D48367	30008	8	14

CM 3/8" LEVER TYPE LOAD BINDER



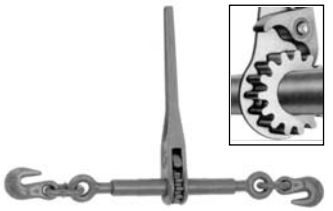
- Provides more control in binding and releasing without extra tools.
- Handle closes down away from load with more leverage.
- Hooks are heat treated steel.
- Functionally superior to any other on the road.
- Handles are drop forged from special bar quality steel.
- Single welded links as in binder chain for better reliability.
- More take-up for binding greater loads. Smaller handle slot with riveted nose to prevent spreading at the critical loading point.
- Meets DOT and CVSA requirements.

CHAIN SIZE (IN.)	CHAIN GRADE	WORKING LOAD LIMIT (LBS.)*	PRODUCT CODE	HANDLE LENGTH (IN.)	TAKE-UP (IN.)	WEIGHT (LBS.)
3/8	30,43,70,80	7,100	D48769	16	4-7/8	8-1/4

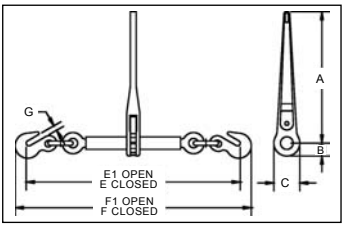
Lebus® Load Binders

Hanes SUPPLY, INC.
YOUR SLING AND RIGGING SPECIALIST

STANDARD RATCHET TYPE LOAD BINDER



L-140

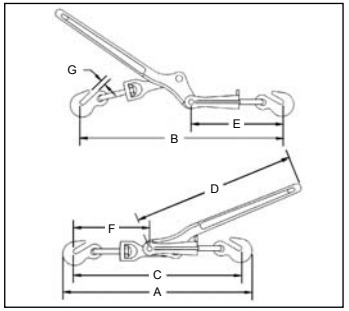


- Upgrade for use with Grade 7 Transport Chain - applies to R-7 only.
- Utilizes standard Crosby A-323 Alloy Eye Grab Hooks.
- New design "one piece" forged handle.
- Continuous take-up feature, infinite adjustment, gets the last half of chain.
- One piece assembly, no bolts or nuts to loosen.
- Ratchet spring rust proofed.
- All load bearing or holding parts forged.
- Easy operating positive ratchet.
- Meets or exceeds CVSA Cargo Securement Guidelines, August 1993.

MODEL	STOCK NO.	MIN-MAX CHAIN SIZE (IN.)	WORKING LOAD LIMIT (LBS.)	PROOF LOAD (LBS.)	MINIMUM ULTIMATE STRENGTH (LBS.)	WEIGHT EACH (IN.)	HANDLE LENGTH (IN.)	TAKE UP (IN.)	DIMENSIONS (IN.)								
									A	B	C	D	E	E1	F	F1	G
R-7	1048404	5/16-3/8	6600	13200	26000	11.23	14	10	8.0	14.00	1.38	2.75	22.94	30.94	25.13	33.13	.50
R-A	1048422	3/8-1/2	9200	18400	33000	12.83	14	10	8.0	14.00	1.38	2.75	25.25	33.25	27.63	35.63	.63
R-C	1048440	1/2-5/8	13000	26000	46000	14.55	14	10	8.0	14.00	1.38	2.75	26.38	34.38	29.44	37.44	.72

NOTE: Binders shown with Proof Load Pounds have been individually Proof Tested to these values shown, prior to shipment.

L-130 MIDGET LOAD BINDER



- Forged handle, hooks and swivel link.
- Steel swivels and clevis.
- Meets or exceeds DOT and CVSA Cargo securement, August 1993.

MODEL	L-130 STOCK NO	MIN-MAX CHAIN SIZE (IN.)	WORKING LOAD LIMIT (LBS.)	ULTIMATE LOAD (LBS.)	WEIGHT EACH (LBS.)	TAKE UP (IN.)	DIMENSIONS (IN.)						
							A	B	C	D	E	F	G
W-1	1048100	3/16-1/4	1450	5100	2.57	2.40	16.13	13.63	11.00	11.25	6.25	6.58	.34

Hanes SUPPLY, INC.
YOUR SLING AND RIGGING SPECIALIST

Nylon Web Sling Properties

- Resistant to Alkalies
- Untreated – approx. 6% stretch; treated – approx. 10% stretch at rated capacity
- Temperature limit is 180°F
- Contains red warning yarns
- Subject to damage by sharp edges

Ratings based on straight pin diameter one-half the sling width.

	WEB WIDTH	CODE NUMBER	RATED CAPACITIES (LBS.) VERTICAL	CHOKER	BASKET
TYPE 1 SLINGS CHOKER & BASKET HITCH TRIANGLE & CHOKER FITTINGS 	**SINGLE PLY SLINGS**				
	2"	TC1-802	3,200	2,500	6,400
	3"	TC1-803	4,800	3,800	9,600
	4"	TC1-804	6,400	5,000	12,800
	5"	TC1-805	8,000	6,400	16,000
	6"	TC1-806	9,600	7,700	19,200
	8"	TC1-808	12,800	10,200	25,600
	10"	TC1-810	16,000	12,800	32,000
	12"	TC1-812	19,200	15,400	38,400
	TWO PLY SLINGS				
	2"	TC2-802	6,400	5,000	12,800
	3"	TC2-803	8,600	6,900	17,200
	4"	TC2-804	11,500	9,200	23,000
	5"	TC2-805	14,000	11,200	28,000
	6"	TC2-806	16,800	13,400	33,600
TYPE 2 SLINGS BASKET & VERTICAL HITCHES ONLY TWO TRIANGLE FITTINGS 	**SINGLE PLY SLINGS**				
	2"	TT1-802	3,200	–	6,400
	3"	TT1-803	4,800	–	9,600
	4"	TT1-804	6,400	–	12,800
	5"	TT1-805	8,000	–	16,000
	6"	TT1-806	9,600	–	19,200
	8"	TT1-808	12,800	–	25,600
	10"	TT1-810	16,000	–	32,000
	12"	TT1-812	19,200	–	38,400
	TWO PLY SLINGS				
	2"	TT2-802	6,400	–	12,800
	3"	TT2-803	8,600	–	17,200
	4"	TT2-804	11,500	–	23,000
	5"	TT2-805	14,000	–	28,000
	6"	TT2-806	16,800	–	33,600
TYPE 3 & 4 SLINGS FLAT OR TWISTED EYES VERTICAL, CHOKER, BASKET HITCHES 	**SINGLE PLY SLINGS**				
	1"	EE1-801	1,600	1,250	3,200
	2"	EE1-802	3,200	2,500	6,400
	3"	EE1-803	4,800	3,800	9,600
	4"	EE1-804	6,400	5,000	12,800
	5"	EE1-805	8,000	6,400	16,000
	6"	EE1-806	9,600	7,700	19,200
	TWO PLY SLINGS				
	1"	EE2-801	3,200	2,500	6,400
	2"	EE2-802	6,400	5,000	12,800
	3"	EE2-803	8,600	6,900	17,200
	4"	EE2-804	11,500	9,200	23,000
	5"	EE2-805	13,600	10,900	27,200
	6"	EE2-806	16,300	13,000	32,600
TYPE 5 SLINGS VERTICAL, CHOKER, BASKET HITCHES ENDLESS OR GROMMET TYPE 	**SINGLE PLY SLINGS**				
	1"	EN1-801	3,200	2,500	6,400
	2"	EN1-802	6,400	5,000	12,800
	3"	EN1-803	8,600	6,900	17,200
	4"	EN1-804	11,500	9,200	23,000
	5"	EN1-805	13,600	10,900	27,200
	6"	EN1-806	16,300	13,000	32,600
	TWO PLY SLINGS				
	1"	EN2-801	6,200	4,900	12,400
	2"	EN2-802	12,200	9,800	24,400
	3"	EN2-803	16,300	13,000	32,600
	4"	EN2-804	20,700	16,500	41,400
	5"	EN2-805	24,500	19,600	49,000
	6"	EN2-806	28,600	23,000	57,200

⚠ WARNING Can fail if damaged, misused or overloaded. Inspect before use. Use only if trained. Observe rated capacity. Avoid sharp edges and exposure to acid, alkali, sunlight and temperature over 180°F. DEATH or INJURY can occur from improper use or maintenance.

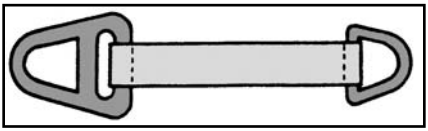
Nylon Web Slings

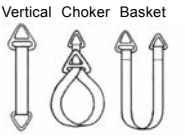
Hanes SUPPLY, INC.
YOUR SLING AND RIGGING SPECIALIST

BASIC SLING TYPES

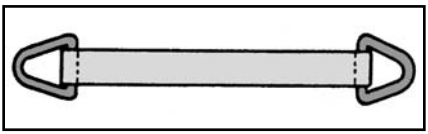
HITCHES

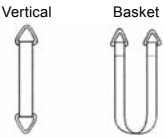
Type 1 TC Slings
Slings with a triangle on one end and a slotted triangle (the choker) on the other end. Choice of lightweight aluminum or durable steel fittings.



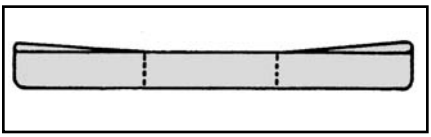


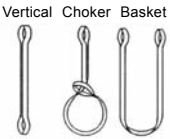
Type 2 TT Slings
Slings with a triangle at both ends. Used in vertical and basket hitches only. Choice of lightweight aluminum or durable steel fittings.



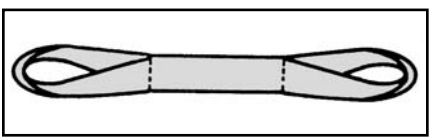


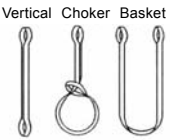
Type 3 EE Slings
Slings with an eye on both ends. Choice of straight or tapered eyes (tapered eye are standard on 2" and larger web-widths).



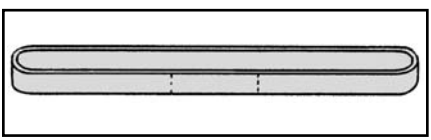


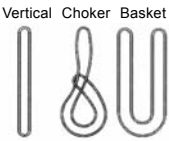
Type 4 EE Slings
Same basic type as Type 3 but eyes are twisted to a right angle to the sling body. (Tapered eye are standard on 2" and larger web-widths).



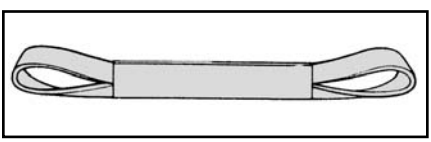


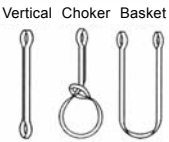
Type 5 EN Slings
Endless slings, sometimes also referred to as grommet slings. The most versatile sling.





Type 6 RE Slings
Return eye sling, also referred to as reversed eye sling. Sling body is formed by 2 parts of webbing sewn side by side using either a cordura tube or web in the finished width.





Can fail if damaged, misused or overloaded. Inspect before use. Use only if trained. Observe rated capacity. Avoid sharp edges and exposure to acid, alkali, sunlight and temperature over 180°F. DEATH or INJURY can occur from improper use or maintenance.

⚠ WARNING

5.2 - MECHANICAL CONSIDERATIONS

5.2.1 Determine weight of the load. The weight of the load shall be within the rated capacity of the sling.

5.2.2 Select the proper sling having suitable characteristics for the type of load, hitch and environment.

5.2.3 Slings shall not be loaded in excess of the rated capacity. Consideration should be given to the angle of lift (sling-to-load angle), which affects rated capacity.

5.2.4 Slings with fittings which are used in a choker hitch shall be of sufficient length to assure that the choking action is on the webbing, and never on the other fitting.

5.2.5 Slings used in a basket hitch shall have the load balanced to prevent slippage.

5.2.6 The opening in fittings shall be the proper shape and size to insure that the fitting will seat properly in the hook or other attachments.

5.2.7 Slings shall always be protected from being cut by sharp corners, sharp edges, protrusions or abrasive surfaces.

5.2.8 Slings shall not be dragged on the floor or over an abrasive surface.

5.2.9 Slings shall not be twisted or tied into knots, or joined by knotting.

5.2.10 Slings shall not be pulled from under loads when the load is resting on the sling.

5.2.11 Do not drop slings equipped with metal fittings.

5.2.12 Slings that appear to be damaged shall not be used unless inspected and accepted as usable under Section 5.2.

5.2.13 The sling shall be hitched in a manner providing control of the load.

5.2.14 Portions of the human body should be kept from between the sling and the load, and from between the sling and the crane hook or hoist hook.

5.2.15 Personnel should stand clear of the suspended load.

5.2.16 Personnel shall not ride the sling.

5.2.17 Shock loading should be avoided.

5.2.18 Twisting the legs (branches) shall be avoided.

5.2.19 Load applied to the hook should be centered in the base (bowl) of hook to prevent point loading on the hook.

5.2.20 During lifting, with or without the load, personnel shall be alert for possible snagging.

5.2.21 The slings' legs (branches) should contain or support the load from the sides above the center of gravity when using a basket hitch.

5.2.22 Slings shall be long enough so that the rated load (rated capacity) is adequate when the angle of the legs (branches) is taken into consideration.

5.3 - ENVIRONMENTAL CONSIDERATIONS

5.3.1 Slings should be stored in a cool, dry and dark place, and should not be exposed to sunlight, to prevent mechanical or chemical damage when not in use.

5.3.2 Chemically active environments can affect the strength of synthetic web slings in varying degrees ranging from none to total degradation. The sling manufacturer should be consulted before slings are used in chemically active environments.

a. **ACIDS**
1. Nylon is subject to degradation in acids, ranging from none to total degradation.
2. Polyester is resistant to many acids, but is subject to degradation, ranging from none to moderate in some acids.
3. Each application shall be evaluated, taking into consideration the following:
   - i Type of Acid
   - ii Exposure to conditions
   - iii Concentration
   - iv Temperature

b. **ALKALIS**
1. Polyester is subject to degradation in alkalis, ranging from none to total degradation.
2. Nylon is resistant to many alkalis, but is subject to degradation ranging from none to moderate in some alkalis.
3. Each application shall be evaluated, taking into consideration the following:
   - i Type of Alkali
   - ii. Exposure to conditions
   - iii Concentration
   - iv Temperature

5.3.3 Nylon and polyester slings shall not be used at temperatures in excess of 180°F (85°C), however, they may be used in temperatures as low as -40°F (-40°C).

5.3.4 Slings incorporating aluminum fittings shall not be used where fumes, vapors, sprays, mists or liquids of alkalis and/or acids are present.

5.3.5 Environments in which synthetic webbing slings are continuously exposed to ultra-violet light can affect the strength of synthetic webbing slings in varying degrees ranging from slight to total degradation.

a. Factors which affect the degree of strength loss are:
1. Length of time of continuous exposure
2. Sling construction and design
3. Other environmental factors such as weather conditions and geographic location.

b. Suggested procedures to minimize the effects of ultra-violet light
1. Store slings in a cool, dry and dark place when not being used for prolonged periods of time
2. Inspect slings weekly or more often depending on frequency of sling use

c. Visual indications of ultra-violet degradation are:
1. Bleaching out of sling color
2. Increased stiffness of sling material
3. Surface abrasion in areas not normally in contact with the load.

d. Proof-Testing – Slings used in environments where they are subject to continuous exposure to ultra-violet light should be proof-tested to two times rated capacity annually, or more frequently depending on severity of exposure.

5.4 - INSPECTION

5.4.1 **TYPE OF INSPECTION**

a. **INITIAL INSPECTION** – Before any new or repaired sling is placed in service, it shall be inspected to insure that the correct sling is being used, as well as to determine that the sling meets the requirements of this specification.

b. **FREQUENT INSPECTION** – This inspection should be made by the person handling the sling each time the sling is used.

c. **PERIODIC INSPECTION** – This inspection shall be conducted by designated personnel. Frequency of inspection should be based on:
1. Frequency of sling use
2. Severity of service conditions
3. Experience gained on the service life of slings used in similar applications
4. Periodic inspections should be conducted at least monthly

5.5 - POSSIBLE DEFECTS

5.5.1 A sling shall be removed from service if any defects such as the following are visible:

a. Acid or alkali burns
b. Melting, charring, or weld spatter of any part of the sling
c. Holes, tears, cuts, snags or embedded particles
d. Broken or worn stitching in load bearing splices
e. Excessive abrasive wear
f. Knots in any part of the sling
g. Distortion and excessive pitting or corrosion or broken fittings
h. Other apparent defects which cause doubt as to the strength of the sling
i. If sling rated capacity or sling material identification is missing or not readable

5.6 - INSPECTION RECORDS

5.6.1 Written inspection records, utilizing the identification for each sling as established by the user, should be kept on file for all slings. These records should show a description of the new sling and its condition on each subsequent inspection.

5.7 - REPAIR OF WEB SLINGS

5.7.1 Slings shall be repaired only by a sling manufacturer. When repaired by other than the original manufacturer, the sling shall be permanently marked to identify the repair agent.

5.7.2 All repaired slings shall be proof-tested to two (2) times its newly assigned rated capacity, berfore being put back into service. Certification of proof-test should be provided.

5.7.3 Temporary repairs of either webbing, fittings, or stitching shall not be permitted.

TRUCKER TIE DOWN AND LASHING EQUIPMENT

RATCHET STRAPS — Designed to handle most types of flatbed tie-down requirements.

- All straps have an 18" fixed end as standard, except for straps with 3705-2 and 3705-3 chain anchors which have a fixed end of 30." Special length fixed ends and alternate end hardware available through Hanes Supply.

  Labeled to meet CVSA guidelines, DOT regulations and WSTDA recommended standards.

2" RATCHET STRAP W/804 WIDE HANDLE AND 2004 WEBBING

10,000 LB. BREAKING STRENGTH

STRAP LENGTH	END HARDWARE	WLL
27'	1015 Flat Hook	3,335 lbs. 1515 kgs.
30'		
27'	3705-2 Chain Anchor	3,335 lbs. 1515 kgs.
27'	1006 Wire Hook	3,335 lbs. 1515 kgs.

3" RATCHET STRAP W/806 LONG HANDLE AND 3004 WEBBING

STRAP LENGTH	END HARDWARE	WLL
27'	1021-3 Flat Hook	5,000 lbs. 2270 kgs.
30'		

15,000 LB. BREAKING STRENGTH

STRAP LENGTH	END HARDWARE	WLL
27'	3705-3 Chain Anchor	5,400 lbs. 2450 kgs.
30'		
27'	3704 Grab Hook	5,400 lbs. 2450 kgs.
30'		

16,200 LB. BREAKING STRENGTH

4" RATCHET STRAP W/808 LONG HANDLE AND 4004 WEBBING

STRAP LENGTH	END HARDWARE	WLL
27'	1021-3 Flat Hook	5,000 lbs. 2270 kgs.
30'		

15,000 LB. BREAKING STRENGTH

STRAP LENGTH	END HARDWARE	WLL
27'	1016 Wire Hook	6,600 lbs. 2995 kgs.
30'		

20,000 LB. BREAKING STRENGTH

TRUCKER TIE DOWN AND LASHING EQUIPMENT

STRAP-ALL™ STRAPS — Light duty tie-down

RATCHET STRAP WITH 800 RATCHET, WIRE HOOKS AND D RINGS
• Breaking Strength: 2,500 lbs./1135 kgs. • WLL: 835 lbs./380 kgs.

RATCHET STRAP WITH 800 RATCHET AND VINYL COATED S HOOKS
• Breaking Strength: 1,200 lbs. • WLL: 400 lbs.

LOGISTIC STRAPS — Designed for interior van loading requirements.
• All straps have a 4' fixed end as standard.
• Adjustable ends are sewn captivated.

2" LOGISTIC STRAPS W / 811 RATCHET BUCKLE AND 4900 WEBBING

STRAP LENGTH (FT)	END HARDWARE	ASSY. BREAKING STRENGTH	WLL
12	Series E, A FE8306-1 Spring Fitting	3,000 lbs. 1360 kgs.	1,000 lbs. 455 kgs.
16			
20			
12	Series E, A 43020-1 3-Piece Fitting	3,000 lbs. 1360 kgs.	1,000 lbs. 455 kgs.
16			
20			
12	Series F 1831 Butterfly Fitting	1,250 lbs. 570 kgs.	420 lbs. 195 kgs.
16			
20			
12	Series F FE8427-1 Plate Trailer Hook	2,200 lbs. 1000 kgs.	735 kgs. 335 kgs.
16			
20			

CM PULLER

CM Puller is designed for heavy-duty construction and industrial applications. Used to pull, lift, drag or stretch, it features:

- Tough aluminum alloy construction and powder coat finish.
- Weatherproof for outdoor service.
- Simple construction with fewer parts for ease of maintenance.
- Hoistaloy hardened steel link type load chain for strength, long wear life and flexibility.
- Weatherized Weston-type automatic braking system for positive load control.
- Easy, one-hand operation and control — only 58 pounds of pull required for 3/4 ton model capacity.
- Forged upper and lower hooks with latches standard.
- Free wheeling for fast and easy attachment to load.
- Upper and lower Latchlok hooks available for all capacities.
- Optional Load Limiter protection device stops transmission of lever forces protecting against dangerous overload.
- Optional anchor sling simplifies attachment to allow anchor hook to swivel in tight space applications (3/4 & 1-1/2 ton units only).
- Optional Load Sentry warns of overload condition.
- Optional shorter lever for 3/4 and 1-1/2 ton units available.
- Optional zinc-plated chain available.
- Unlimited lift.
- Lifetime warranty.
- Made in U.S.A.

3/4 ton Puller Shown
Also available in 1-1/2, 3 & 6 ton capacity

Optional Load Security

RATED CAPACITY (TONS)	PROD. CODE	STD. LIFT† (FT)	PULL TO LIFT FULL LOADS (LBS)	MINIMUM DISTANCE BETWEEN HOOKS (IN)	LEVER LENGTH (IN)	REEVING	HOOK THROAT OPENINGS (IN)	APPROX. SHIPPING WEIGHT (LBS)
3/4	4043	5	58	10-3/4	21-1/4	1	1-1/32	16
1-1/2	4045	5	89	14-1/4	21-1/4	1	1-1/8	16
3	4047	5	95	16-15/16	21-1/4	2	1-7/32	38
6	4050	5	96	21-3/8	21-1/4	4	1-3/4	73

† Can be supplied with lifts longer than 5 feet

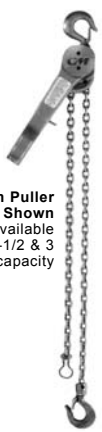
Optional Load Limiter

Latchlok type hook

Optional anchor sling (3/4 & 1-1/2 ton)

CM SHORT HANDLE PULLER

- Easy one-hand operation.
- Lever pull range is 45 to 62 pounds to lift full load.
- Handle that rotates 360°, making it easy to operate in any position and in small spaces.
- Tough yet lightweight aluminum construction and powder coat finish.
- CM® Hoistaloy® hardened steel load chain for strength, long wear life and flexibility.
- Free chaining for fast, easy attachment to load.
- Forged upper and lower hooks with latches.
- Simple construction with fewer parts for ease of maintenance.
- Optional Load Limiter® device protects against overload
- Lifetime warranty
- Made in U.S.A.



3/4 ton Puller Shown
Also available in 1-1/2 & 3 ton capacity

RATED CAPACITY (TONS)	PRODUCT CODE	STD. LIFT (FT)	REEVING	PULL TO LIFT FULL LOAD (LBS)	LEVER LENGTH (IN.)	HOOK THROAT OPENING (IN)	MIN. DISTANCE BETWEEN HOOKS (IN)	APPROX. SHIPPING WT. (LBS)
3/4	7300P	5	1	45	12	1-1/32	12-1/4	16
1-1/2	7320P	5	1	55	16-3/4	1-1/8	14-3/4	27
3	7330P	5	2	62	16-3/4	1-3/16	17-5/8	40

Optional kits also available - Load Limiter, Anchor Sling & Latchlok® Hook. Call Hanes Supply for complete details.

CM CYCLONE HAND CHAIN HOIST

One of the most popular and reliable hoists ever designed, the CM Cyclone combines superior engineering, efficiency and durability. Available in a variety of capacities from 1/4 ton to 10 tons, CM Cyclone features:

- Most interchangeability of parts in the industry.
- Standard Load Limiter for simple, automatic overload protection.
- Enclosed contoured Weston-type automatic brake for positive load control.
- High-efficiency spur gearing for greater lift with minimum effort.
- Rugged CM Hoistaloy chain for added strength and durability.
- Fully machined, forged liftwheel pickets for easier lifting and smooth free chaining.
- High-strength aluminum alloy castings in frame and covers.
- Inspected over 75 times to meet or exceed HMI and ASME/ANSI performance and safety standards.
- Standard hand chain drop is 2 feet less than lift, (example: 8 foot lift hoist has 6 foot hand chain drop).
- Chain containers, zinc-plated load and hand chain, aluminum unwelded hand chain, Latchlok hooks, bronze hooks, eye-type suspension, bullard hooks and units without Load Limiter optional, depending on capacity.
- Lifetime warranty.
- Made in U.S.A.

1/4 to 2 Ton Capacity

RATED CAPACITY (TONS)	PRODUCT CODE	STANDARD LIFT † (FT.)	REEVING	MINIMUM DISTANCE BETWEEN HOOKS (IN.)	CHAIN OVERHAULED TO LIFT LOAD ONE FOOT (FT.)	CHAIN PULL TO LIFT FULL (LBS.)	SHIPPING WEIGHT (LBS.)
1/4	4621	8	1	12-7/8	22-1/2	23	37
1/2	4622	8	1	12-7/8	22-1/2	46	37
1	4624	8	1	14	30	69	40
1-1/2	4625	8	1	17-5/16	40-1/2	80	65
2	4626	8	1	17-5/16	52	83	64
3	4627	8	2	21-1/2	81	85	96
4	4628	8	3	21-1/2	104	88	96
5	4629	8	3	24-1/4	156	75	128
6	4630	8	3	25-1/4	156	90	132
8	4631	8	4	34-1/2	208	89	235
10	4632	8	5	35-1/2	260	95	249

† Can be supplied with longer lifts

3 and 4 Ton Capacity

5 and 6 Ton Capacity

8 Ton Capacity

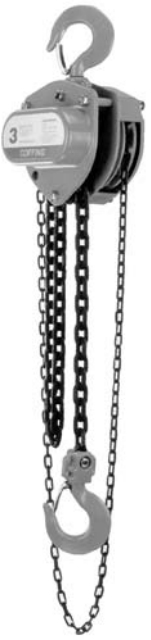
10 Ton Capacity

Hanes Supply 25 Ton Capacity Test Stand

LHH HAND CHAIN HOIST

Coffing LHH Models - Stamped steel hand chain hoists are an excellent low cost option in the Coffing line. The compact, lighweight design is ideal for construction and contractor applications where portability and easy rigging are critical.

- Capacities and Lift - Rated loads from 1/2 to 20 tons in stock with standard lifts of 10, 15 and 20 feet. Standard hand chain drop is 2 feet less than lift. Other lifts and hand chain drops, and 25 - 50 Ton models available - Please contact Hanes Supply for details.
- Compact and Light Weight - Designed for portability and easy installation. Compact gear housing provides low headroom.
- Easy to Operate - Lubricated bearings and bushings, bearing mounted pinions, and heat-treated spur gearing ensure smooth and efficient operation with minimal effort.
- Safety and Load Control - Mechanical load brake engages instantly for precise load holding and positioning. 360 degree swivel hooks with safety latches for positive load engagement.
- Durable - Through-hardened load chain provides added strength and wear resistance for greater chain life. Stamped steel housing withstands rugged conditions.
- Easy to Maintain - Designed for easy maintenance. Hoist can be dismantled easily with simple hand tools.
- Lifetime Warranty.



1/4 to 50 Ton Capacity

CAPACITY (LBS)	CAPACITY (TONS)	MODEL†	LIFTS (FT)**	STRANDS OF LOAD CHAIN	MINIMUM HEAD-ROOM (IN)	AVG. OVERHAUL FOR 1 FT. LIFT (FT)	NET PULL TO LIFT RATED LOAD (LBS)	WT. FOR 10 FT. LIFT (LBS)
1,000	1/2	LHH-1/2	10/15/20	1	10-1/4	32	55	19
2,000	1	LHH-1	10/15/20	1	11-13/16	56	53	25
3,000	1-1/2	LHH-1-1/2	10/15/20	1	13-9/16	75	65	36
4,000	2	LHH-2	10/15/20	1	15	75	74	45
6,000	3	LHH-3	10/15/20	1	17-1/8	95	84	66
10,000	5	LHH-5	10/15/20	3	22-5/8	203	79	75
16,000	8	LHH-8	10/20	3	32-1/2	312.5	77	158
20,000	10	LHH-12	10/20	3	32-1/2	312.5	95	158
24,000	12	LHH-12	10/20	5	50-5/8	526	84	328
30,000	15	LHH-15	10/20	5	50-5/8	526	103	328
40,000	20	LHH-20	10	6	52-3/8	312.5 x 2 †	99 x 2 †	535
50,000	25*	LHH-25	10	8	52-7/8	416.7 x 2 †	97 x 2 †	680
60,000	30*	LHH-30	10	10	65	526.3 x 2 †	104 x 2 †	945
80,000	40*	LHH-40	10	14	73-5/16	714.3 x 2 †	104 x 2 †	1,400
100,000	50*	LHH-50	10	20	77-5/8	1000 x 2 †	104 x 2 †	1,840

*25, 30, 40 and 50 ton models available by special order - contact Hanes Supply for more details.
**Standard lifts shown. Other lifts available - contact Hanes Supply for more details.
† LHH-20 through LHH-50 models have two hand chains.
NOTE: Please contact Hanes Supply for complete dimensional data.

CM LODESTAR ELECTRIC CHAIN HOIST

The balanced, integrated, proven design of the Lodestar has made it the most popular electric chain hoist in the industry. Lodestar gives you more value for your money including:

- Up to 3 ton capacities for heavy-duty industrial applications.
- Gear train lifetime lubricated with non-oxidizing grease.
- Precision machined and hardened liftwheel with hardened chain guides for precise chain liftwheel fit.
- Grearing designed for exceptionally long life and quiet operation.
- H4 duty standard.
- Rugged control station (NEMA 4).
- Hoist duty motor, standard Protector overload device and standard screw type limit switches.
- Hardened, forged steel, latch type hooks and Hoistaloy load chain for long, dependable service.
- Easy to install and maintain.
- No special tools required to disassemble.
- High reliability and long life.
- Designed for greater productivity, efficiency and economy.
- Lifetime warranty.
- Each hoist thoroughly inspected and tested to over 125% of rated load prior to shipment.
- Meets ASME B30.16.
- Made in U.S.A.

Special Applications

- Harsh environment hoists available for severe duty of plating, galvanizing and washdown applications.
- Hoists with climbing capability available for temporary rigging of lifting applications – must be used in inverted position only.
- Hoists with creep control allow precise positioning through field adjustment within the range of approximately 1/16" to 1/2".

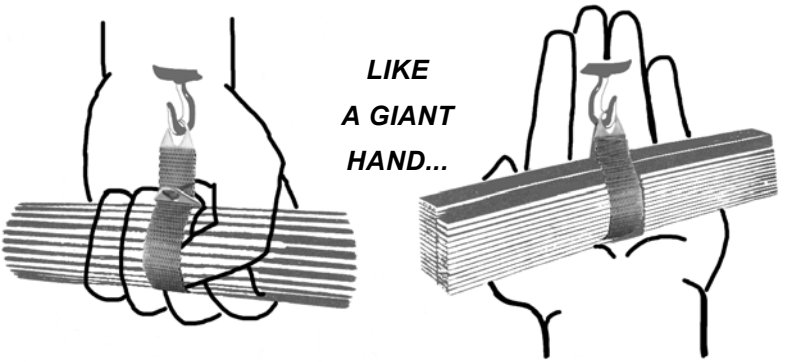
Hook Suspension

Motorized

Plain Trolley

Wire Mesh Slings

Hanes SUPPLY, INC.
YOUR SLING AND RIGGING SPECIALIST



STRONG, GENTLE GRIP – SAFE, SURE BALANCE MAKES

BEST FOR FAST, SAFE, EASY LIFTS

Safer than wire rope, gentle as canvas, flexible as manila...that's only a part of the story of the Gripper Sling – the ultimate in versatile materials handling tools. Like a giant hand, Gripper Slings grasp and hold the load in a strong, gentle grip when used in a choke hitch... safely and gently cradle it on a broad, flat surface in a basket hitch.

Whatever the size or shape of the load you handle – rounds, flats, hexes or squares--Gripper Slings can reduce load damage in production or shipping, provide greater safety for load and operator, cut rigging and unhitching time and eliminate the need for two-legged slings. Here's how –

NO LOAD DAMAGE – The unique woven wire construction of Gripper Slings consists of a series of smooth, spiral wires joined together across the body of the sling. This gives the sling complete flexibility, enabling it to bend easily around even irregularly shaped loads and eliminating the danger of gouging or marring edges of the load members. For turned or ground surfaces, PVS or Neoprene-covered slings assure extremely delicate handling.

SAFE – The wide bearing surface of the Gripper Sling provides better load balance and gripping power...less crushing effect when handling hollow tubing or similar parts. Its instant gripping action means there's no slipping of shifting when load is applied. All metal construction means there's no core to rot, nothing to tear suddenly. Gripper Slings will not whip, kink or tangle, and there are no loose strands to snag load or operator. As for rigging and hitching, a single man can easily do the job.

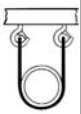
STRONG – Thousands of spiral wire loops in a transverse construction give Gripper Slings exceptionally long life. Should a single wire break, the slack is absorbed by the rest of the sling. Gripper Slings are pretested and guaranteed to meet load specifications. Standard lengths and widths with capacities up to 100,000 lbs. are available. Special sizes and corrosion resistant alloys available on request.

Inspect before use. Follow OSHA, ANSI B30.9 or Manufacturers Guidelines. Use by untrained persons is hazardous. Improper use will result in serious injury or death. Do not exceed rated capacity. This product will fail if damaged, abused, misused, overused or improperly maintained.

⚠ WARNING

HOW TO SELECT PROPER SLING WIDTH

First, determine the hitch you will use for the guage slected. Then read down the column under the selected hitch and guage to the load weight you wish to lift. Then read across to the first column at left to find *sling width* required. Example: You wish to use a G-43 sling in a choke hitch to lift 6,400 poiunds. Sling width required is 8".

				EFFECT OF ANGLE ON RATED CAPACITIES IN BASKET HITCH		
	NOMINAL WIDTH OF SLING (IN)	 CHOKER	 VERTICAL BASKET	 30° VERT. 60° HORZ.	 45° VERT. 45° HORZ.	 60° VERT. 30° HORZ.
G-35 HEAVY DUTY	2	1,600	3,200	2,700	2,000	1,600
	3	3,000	6,000	5,100	3,800	2,800
	4	4,400	8,800	7,480	5,600	4,400
	6	6,600	13,200	11,225	8,400	6,600
	8	8,800	17,600	15,000	11,250	8,800
	10	11,000	22,000	18,700	14,000	11,000
	12	13,200	26,440	22,440	16,800	13,200
	14	15,400	30,800	26,180	19,600	15,400
	16	17,600	35,200	29,920	22,400	17,600
	18	19,800	39,600	33,660	25,200	19,800
	20	22,000	44,000	37,400	28,000	22,000
G-43 MED. DUTY	2	1,450	2,900	2,320	1,740	1,450
	3	2,175	4,350	3,700	2,700	2,175
	4	2,900	5,800	4,900	3,670	2,900
	6	4,800	9,600	8,150	6,100	4,800
	8	6,400	12,800	10,880	8,100	6,400
	10	8,000	16,000	13,600	10,200	8,000
	12	9,600	19,200	16,300	12,000	9,600
	14	11,200	22,400	19,000	14,000	11,200
	16	12,800	25,600	21,700	16,200	12,800
	18	13,500	27,000	22,900	17,000	13,500
	20	15,000	30,000	25,500	19,000	15,000
G-59 LIGHT DUTY	2	900	1,800	1,600	1,300	900
	3	1,400	2,800	2,400	2,000	1,400
	4	2,000	4,000	3,500	2,800	2,000
	6	3,000	6,000	5,200	4,200	3,000
	8	4,000	8,000	6,900	5,700	4,000
	10	5,000	10,000	8,600	7,100	5,000
	12	6,000	12,000	10,400	8,500	6,000
	14	7,000	14,000	12,100	9,900	7,000
	16	8,000	16,000	13,900	11,300	8,000
	18	9,000	18,000	15,600	12,700	9,000
	20	10,000	20,000	17,300	14,100	10,000

SAFETY FACTOR OF 5

WARNING Inspect before use. Follow OSHA, ANSI B30.9 or Manufacturers Guidelines. Use by untrained persons is hazardous. Improper use will result in serious injury or death. Do not exceed rated capacity. This product will fail if damaged, abused, misused, overused or improperly maintained.

MANILA ROPE SLINGS

Table H-15

ROPE DIA. NOM. (IN.)	NOM. WGT. PER 100 FT. (LBS.)	MIN. BREAK STRENGTH (LBS.)	RATED CAPACITY IN POUNDS (SAFETY FACTOR = 5)											
			EYE AND EYE SLING						ENDLESS SLING					
					BASKET HITCH						BASKET HITCH			
					ANGLE OF ROPE TO HORIZONTAL						ANGLE OF ROPE TO HORIZONTAL			
					90°	60°	45°	30°			90°	60°	45°	30°
			VERT. HITCH	CHOKER HITCH	ANGLE OF ROPE TO VERTICAL				VERT HITCH	CHOKER HITCH	ANGLE OF ROPE TO VERTICAL			
					0°	30°	45°	60°			0°	30°	45°	60°
1/2	7.5	2,650	550	250	1,100	900	750	550	950	500	1,900	1,700	1,400	950
9/16	10.4	3,450	700	350	1,400	1,200	1,000	700	1,200	600	2,500	2,200	1,800	1,200
5/8	13.3	4,400	900	450	1,800	1,500	1,200	900	1,600	800	3,200	2,700	2,200	1,600
3/4	16.7	5,400	1,100	550	2,200	1,900	1,500	1,100	2,000	950	3,900	3,400	2,800	2,000
13/16	19.5	6,500	1,300	650	2,600	2,300	1,800	1,300	2,300	1,200	4,700	4,100	3,300	2,300
7/8	22.5	7,700	1,500	750	3,100	2,700	2,200	1,500	2,800	1,400	5,600	4,800	3,900	2,800
1	27.0	9,000	1,800	900	3,600	3,100	2,600	1,800	3,200	1,600	6,500	5,600	4,600	3,200
1-1/16	31.3	10,500	2,100	1,100	4,200	3,600	3,000	2,100	3,800	1,900	7,600	6,600	5,400	3,800
1-1/8	36.0	12,000	2,400	1,200	4,800	4,200	3,400	2,400	4,300	2,200	8,600	7,500	6,100	4,300
1-1/4	41.7	13,500	2,700	1,400	5,400	4,700	3,800	2,700	4,900	2,400	9,700	8,400	6,900	4,900
1-5/16	47.9	15,000	3,000	1,500	6,000	5,200	4,300	3,000	5,400	2,700	11,000	9,400	7,700	5,400
1-1/2	59.9	18,500	3,700	1,850	7,400	6,400	5,200	3,700	6,700	3,300	13,500	11,500	9,400	6,700
1-5/8	74.6	22,500	4,500	2,300	9,000	7,800	6,400	4,500	8,100	4,100	16,000	14,000	11,500	8,000
1-3/4	89.3	36,500	5,300	2,700	10,500	9,200	7,500	5,300	9,500	4,800	19,000	16,500	13,500	9,500
2	107.5	31,000	6,200	3,100	12,500	10,500	8,800	6,200	11,000	5,600	22,500	19,500	16,000	11,000
2-1/3	125.0	36,000	7,200	3,600	14,500	12,500	10,000	7,200	13,000	6,500	26,000	22,500	18,500	13,000
2-1/4	146.0	41,000	8,200	4,100	16,500	14,000	11,500	8,200	15,000	7,400	29,500	25,500	21,000	15,000
2-1/2	166.7	46,500	9,300	4,700	18,500	16,000	13,000	9,300	16,500	8,400	33,500	29,000	23,500	16,500
2-5/8	190.8	52,000	10,500	5,200	21,000	18,000	14,500	10,500	18,500	9,500	37,500	32,500	26,500	18,500

NYLON ROPE SLINGS

Table H-16

ROPE DIA. NOM. (IN.)	NOM. WGT. PER 100 FT. (LBS.)	MIN. BREAK STRENGTH (LBS.)	RATED CAPACITY IN POUNDS (SAFETY FACTOR = 5)											
			EYE AND EYE SLING						ENDLESS SLING					
					BASKET HITCH						BASKET HITCH			
					ANGLE OF ROPE TO HORIZONTAL						ANGLE OF ROPE TO HORIZONTAL			
					90°	60°	45°	30°			90°	60°	45°	30°
			VERT. HITCH	CHOKER HITCH	ANGLE OF ROPE TO VERTICAL				VERT HITCH	CHOKER HITCH	ANGLE OF ROPE TO VERTICAL			
					0°	30°	45°	60°			0°	30°	45°	60°
1/2	6.5	6,080	700	350	1,400	1,200	950	700	1,200	600	2,400	2,100	1,700	1,200
9/16	8.3	7,600	850	400	1,700	1,500	1,200	850	1,500	750	3,000	2,600	2,200	1,500
5/8	10.5	9,800	1,100	550	2,200	1,900	1,600	1,100	2,000	1,000	4,000	3,400	2,800	2,000
3/4	14.5	13,490	1,500	750	3,000	2,600	2,100	1,500	2,700	1,400	5,400	4,700	3,800	2,700
13/16	17.0	16,150	1,800	900	3,600	3,100	2,600	1,800	3,200	1,600	6,400	5,600	4,600	3,200
7/8	20.0	19,000	2,100	1,100	4,200	3,700	3,000	2,100	3,800	1,900	7,600	6,600	5,400	3,800
1	26.0	23,750	2,600	1,300	5,300	4,600	3,700	2,600	4,800	2,400	9,500	8,200	6,700	4,800
1-1/16	29.0	27,360	3,000	1,500	6,100	5,300	4,300	3,000	5,500	2,700	11,000	9,500	7,700	5,500
1-1/8	34.0	31,350	3,500	1,700	7,000	6,000	5,000	3,500	6,300	3,100	12,500	11,000	8,900	6,300
1-1/4	40.0	35,625	4,000	2,000	7,900	6,900	5,600	4,000	7,100	3,600	14,500	12,500	10,000	7,100
1-5/16	45.0	40,850	4,500	2,300	9,100	7,900	6,400	4,500	8,200	4,100	16,500	14,000	12,000	8,200
1-1/2	55.0	50,530	5,600	2,800	11,000	9,700	7,900	5,600	10,000	5,000	20,000	17,500	14,000	10,000
1-5/8	68.0	61,750	6,900	3,400	13,500	12,000	9,700	6,900	12,500	6,200	24,500	21,500	17,500	12,500
1-3/4	83.0	74,100	8,200	4,100	16,500	14,500	11,500	8,200	15,000	7,400	29,500	27,500	21,000	15,000
2	95.0	87,400	9,700	4,900	19,500	17,000	13,500	9,700	17,500	8,700	35,000	30,500	24,500	17,500
2-1/8	109.0	100,700	11,000	5,600	22,500	19,500	16,000	11,000	20,000	10,000	40,500	35,000	28,500	20,000
2-1/4	129.0	118,750	13,000	6,600	26,500	23,000	18,500	13,000	24,000	12,000	47,500	41,000	33,500	24,000
2-1/2	149.0	133,000	15,000	7,400	29,500	25,500	21,000	15,000	26,500	13,500	53,000	46,000	37,500	26,500
2-5/8	168.0	153,900	17,100	8,600	34,000	29,500	24,000	17,000	31,000	15,500	61,500	53,500	43,500	31,000

POLYESTER ROPE SLINGS

Table H-17

ROPE DIA. NOM. (IN.)	NOM. WGT. PER 100 FT. (LBS.)	MIN. BREAK STRENGTH (LBS.)	RATED CAPACITY IN POUNDS (SAFETY FACTOR = 5)											
			EYE AND EYE SLING						ENDLESS SLING					
					BASKET HITCH						BASKET HITCH			
					ANGLE OF ROPE TO HORIZONTAL						ANGLE OF ROPE TO HORIZONTAL			
					90°	60°	45°	30°			90°	60°	45°	30°
			VERT. HITCH	CHOKER HITCH	ANGLE OF ROPE TO VERTICAL				VERT HITCH	CHOKER HITCH	ANGLE OF ROPE TO VERTICAL			
					0°	30°	45°	60°			0°	30°	45°	60°
1/2	8.0	6,080	700	350	1,400	1,200	950	700	1,200	600	2,400	2,100	1,700	1,200
9/16	10.2	7,600	850	400	1,700	1,500	1,200	850	1,500	600	2,400	2,100	1,700	1,200
5/8	13.0	9,500	1,100	550	2,100	1,800	1,500	1,100	1,900	950	3,800	3,300	2,700	1,900
3/4	17.5	11,875	1,300	650	2,600	2,300	1,900	1,300	2,400	1,200	4,800	4,100	3,400	2,400
13/16	21.0	14,725	1,600	800	3,300	2,800	2,300	1,600	2,900	1,500	5,900	5,100	4,200	2,900
7/8	25.0	17,100	1,900	950	3,800	3,300	2,700	1,900	3,400	1,700	6,800	5,900	4,800	3,400
1	30.5	20,900	2,300	1,200	4,600	4,000	3,300	2,300	4,200	2,100	8,400	7,200	5,900	4,200
1-1/16	34.5	24,225	2,700	1,300	5,400	4,700	3,800	2,700	4,800	2,400	9,700	8,400	6,900	4,800
1-1/8	40.0	28,025	3,100	1,600	6,200	5,400	4,400	3,100	5,600	2,800	11,000	9,700	7,900	5,600
1-1/4	46.3	31,540	3,500	1,800	7,000	6,100	5,000	3,500	6,300	3,200	12,500	11,000	8,900	6,300
1-5/16	52.5	35,625	4,000	2,000	7,900	6,900	5,600	4,000	7,100	3,600	14,500	12,500	10,000	7,100
1-1/2	66.8	44,460	4,900	2,500	9,900	8,600	7,000	4,900	8,900	4,400	18,000	15,500	12,500	8,900
1-5/8	82.0	54,150	6,000	3,000	12,000	10,400	8,500	6,000	11,000	5,400	21,500	19,000	15,500	11,000
1-3/4	82.0	64,410	7,200	3,600	14,500	12,500	10,000	7,200	13,000	6,400	26,000	22,500	18,000	13,000
2	118.0	76,000	8,400	4,200	17,000	14,500	12,000	8,400	15,000	7,600	30,500	26,500	21,500	15,000
2-1/8	135.0	87,400	9,700	4,900	19,500	17,000	13,500	9,700	17,500	8,700	35,000	30,500	24,500	17,500
2-1/4	157.0	101,650	11,500	5,700	22,500	19,500	16,000	11,500	20,500	10,000	40,500	35,000	29,000	20,500
2-1/2	181.0	115,900	13,000	6,400	26,000	22,500	18,000	13,000	23,000	11,500	46,500	40,000	33,000	23,000
2-5/8	205.0	130,150	14,500	7,200	29,000	25,000	20,500	14,500	26,000	13,000	52,000	45,000	37,000	26,000

POLYPROPYLENE ROPE SLINGS

Table H-18

ROPE DIA. NOM. (IN.)	NOM. WGT. PER 100 FT. (LBS.)	MIN. BREAK STRENGTH (LBS.)	RATED CAPACITY IN POUNDS (SAFETY FACTOR = 5)											
			EYE AND EYE SLING						ENDLESS SLING					
					BASKET HITCH						BASKET HITCH			
					ANGLE OF ROPE TO HORIZONTAL						ANGLE OF ROPE TO HORIZONTAL			
					90°	60°	45°	30°			90°	60°	45°	30°
			VERT. HITCH	CHOKER HITCH	ANGLE OF ROPE TO VERTICAL				VERT HITCH	CHOKER HITCH	ANGLE OF ROPE TO VERTICAL			
					0°	30°	45°	60°			0°	30°	45°	60°
1/2	4.7	3,900	650	350	1,300	1,200	950	650	1,200	600	2,400	2,100	1,700	1,200
9/16	6.1	4,845	800	400	1,600	1,400	1,100	650	1,200	600	2,400	2,100	1,700	1,200
5/8	7.5	5,890	1,000	500	2,000	1,700	1,400	1,000	1,800	900	3,500	3,100	2,500	1,800
3/4	10.7	8,075	1,300	700	2,700	2,300	1,900	1,300	2,400	1,200	4,900	4,200	3,400	2,400
13/16	12.7	9,405	1,600	800	3,100	2,700	2,200	1,600	2,800	1,400	5,600	4,900	4,000	2,800
7/8	15.0	10,925	1,800	900	3,600	3,200	2,600	1,800	3,300	1,600	6,600	5,700	4,600	3,300
1	18.0	13,300	2,200	1,100	4,400	3,800	3,100	2,200	4,000	2,000	8,000	6,900	5,600	4,000
1-1/16	20.4	15,200	2,500	1,300	5,100	4,400	3,600	2,500	4,600	2,300	9,100	7,900	6,500	4,600
1-1/8	23.7	17,385	2,900	1,500	5,800	5,000	4,100	2,900	5,200	2,600	10,500	9,000	7,400	5,200
1-1/4	27.0	19,950	3,300	1,700	6,700	5,800	4,700	3,300	6,000	3,000	12,000	10,500	8,500	6,000
1-5/16	30.5	22,325	3,700	1,900	7,400	6,400	5,300	3,700	6,700	3,400	13,500	11,500	9,500	6,700
1-1/2	38.5	28,215	4,700	2,400	9,400	8,100	6,700	4,700	8,500	4,200	17,000	14,500	12,000	8,500
1-5/8	47.5	34,200	5,700	2,900	11,500	9,900	8,100	5,700	10,500	5,100	20,500	18,000	14,500	10,500
1-3/4	57.0	40,850	6,800	3,400	13,500	12,000	9,600	6,800	12,500	6,100	24,500	21,000	17,500	12,500
2	69.0	49,400	8,200	4,100	16,500	14,500	11,500	8,200	15,000	7,400	29,500	25,500	21,500	15,000
2-1/8	80.0	57,950	9,700	4,800	19,500	16,500	13,500	9,700	17,500	8,700	35,000	30,100	24,500	17,500
2-1/4	92.0	65,550	11,000	5,500	22,000	19,000	15,500	11,000	19,500	9,900	39,500	34,000	28,000	19,500
2-1/2	107.0	76,000	12,500	6,300	25,500	22,000	18,000	12,500	23,000	11,500	45,500	39,500	32,500	23,000
2-5/8	120.0	85,500	14,500	7,100	28,500	24,500	20,000	14,500	25,500	13,000	51,500	44,500	36,500	25,500

ROPE SPECIFICATIONS
THREE STRAND AND EIGHT STRAND – STANDARD LAY ROPES

DIA. (IN.)	CIR. (IN.)	POLYPRO			NYLON			POLYESTER			MANILA		
		LBS. PER 100'	FEET PER LB.	BRK. STGTH. (LBS.)	LBS. PER 100'	FEET PER LB.	BRK. STGTH. (LBS.)	LBS. PER 100'	FEET PER LB.	BRK. STGET. (LBS.)	LBS. PER 100'	FEET PER LB.	BRK. STGTH. (LBS.)
3/16	5/8	.75	133.0	800	1.0	100.0	1,000	1.2	83.4	850	1.5	66.7	450
1/4	3/4	1.2	83.4	1,250	1.5	66.7	1,650	2.0	50.0	1,650	2.0	50.0	600
5/16	1	1.8	55.6	1,900	2.5	40.0	2,550	3.1	32.2	2,550	3.0	35.0	1,000
3/8	1-1/8	2.8	35.7	2,700	3.5	28.5	3,700	4.5	22.2	3,700	4.0	25.0	1,350
7/16	1-1/4	3.8	26.3	3,500	5.0	20.0	5,000	6.2	16.1	5,000	5.3	19.0	1,750
1/2	1-1/2	4.7	21.3	4,200	6.5	15.4	6,400	8.0	12.5	6,400	7.5	13.3	2.650
5/8	2	7.5	13.3	6,200	10.5	9.5	10,400	13.0	7.7	10,000	13.3	7.5	4,400
3/4	2-1/4	10.7	9.3	8,500	14.5	6.9	14,000	17.5	5.7	12,500	16.7	6.0	5,400
7/8	2-3/4	15.0	6.7	11,500	20.0	5.0	20,000	25.0	4.0	18,000	22.0	4.5	7,700
1	3	18.0	5.5	14,000	26.0	3.8	25,000	30.5	3.3	22,000	27.0	3.7	9,000
1-1/8	3-1/2	23.7	4.2	18,300	34.0	2.9	33,000	40.0	2.5	29,500	36.0	2.8	12,000
1-1/4	3-3/4	27.0	3.7	21,000	40.0	2.5	37,500	46.3	2.5	33,200	42.0	2.4	13,500
1-5/16	4	30.5	3.3	23,500	45.0	2.2	43,000	52.5	1.9	37,500	48.0	2.2	–
1-1/2	4-1/2	38.5	2.6	29,700	55.0	1.8	53,000	66.8	1.5	46,800	60.0	1.7	18,500
1-5/8	5	47.5	2.1	36,000	68.0	1.5	65,000	82.0	1.2	57,000	75.0	1.3	22,500
1-3/4	5-1/2	57.0	1.7	43,000	83.0	1.2	78,000	98.0	1.02	67,800	90.0	1.1	26,500
2	6	69.0	1.4	53,000	95.0	1.1	92,000	118.0	.85	75,000	108.0	.93	31,000
2-1/8	6-1/2	80.0	1.2	62,000	109.0	.92	105,000	135.0	.75	81,000	125.0	.79	36,000
2-1/4	7	92.0	1.1	70,000	129.0	.77	125,000	157.0	.64	96,000	146.0	.69	41,000
2-1/2	7-1/2	107.0	.93	80,500	150.0	.67	138,000	181.0	.55	110,000	167.0	.59	46,500
2-5/8	8	120.0	.83	90,000	168.0	.59	154,000	205.0	.49	125,000	191.0	.53	52,000
2-7/8	8-1/2	137.0	.73	100,000	189.0	.53	173,000	230.0	.43	140,000	213.0	.47	58,000
3	9	153.0	.65	116,000	210.0	.47	195,000	258.0	.39	158,000	242.0	.42	64,000
3-1/4	10	190.0	.52	137,000	263.0	.38	238,000	319.0	.31	190,000	299.0	.33	77,000
3-1/2	11	232.0	.43	162,000	316.0	.31	288,000	384.0	.26	230,000	367.0	.28	91,000
4	12	275.0	.36	190,000	379.0	.26	342,000	460.0	.21	275,000	436.0	.23	105,000

USAGE / MAINTENANCE GUIDE

2-in-1® DOUBLE BRAIDED ROPE

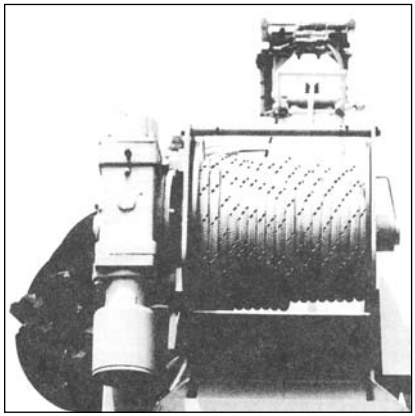
Samson 2-IN1® Double Braided Rope is actually two ropes in one. First the braided core is constructed. A second rope is then braided over it to form the cover. You then have two ropes performing as a single integrated strength member. By altering the construction of the core and/or cover, it is possible to engineer a rope with specific performance characteristics.

For Example:

STABLE BRAID
- Balanced construction – core and cover share the load equally

NYSTRON
- Fiber selection – different fiber combinations in the core and cover to meet specific performance requirements

SPECTRON II
- Imbalanced construction – core and cover have different load sharing capabilities.
- Coatings may be applied to selected sections or to continuous long lengths.



WINCH LINE SELECTION GUIDE

SIZE (Dia.)	1/2"	9/16"	5/8"	3/4"	13/16"	7/8"	1"	1-1/8"	1-1/4"	ELASTIC ELONGATION* 10%	20%	30%
STABLE BRAID												
Approx. Avg. Tensile Lbs.	9,870	12,600	15,500	19,400		28,400	37,200	45,800	54,400	1.1	1.7	2.7
Approx. Wgt. Per 100 Ft. Lbs.	8.5	10.9	13.7	17.2		25.9	34.4	42.7	51.2			
NYSTROM												
Approx. Avg. Tensile Lbs.	10,500	13,200	16,300	23,000		30,800	40,400	49,800	59,100	3.7	5.3	6.9
Approx. Wgt. Per 100 Ft. Lbs.	7.7	10.0	12.6	17.3		23.7	31.5	39.2	46.9			
SPECTRON II												
Approx. Avg. Tensile Lbs.	15,500	22,000	27,000	35,000	40,000	50,000	57,000	72,900	81,000	.57	.76	.92
Approx. Wgt. Per 100 Ft. Lbs.	8.1	9.8	12.3	15.7	19.9	24.3	27.8	34.6	40.2			

*Elastic Elongation after 50 Cycles from 2000D²

GUIDELINES FOR THE USE OF SAMSON WINCH LINES

ROPE STRENGTH

Note carefully the quoted breaking strengths of the various Samson Braid sizes. These are approximate average breaking strengths and are subject to a plus or minus 5% testing tolerance. Advertised breaking strengths are determined by the standard cordage testing and do not cover conditions such as sustained loads or shock loading. These strengths are attained under laboratory conditions. Remember also, that this is a breaking strength--not a recommended working load capacity. (See next paragraph for working load factors.)

ASSIGNED WORKING LOAD FACTORS

Will vary in accordance with varying safety practices and policies of different utilities and industrial users. However, our recommendation, and one that is fairly well accepted in the industry, is a minimum 5:1 working load factor. Thus, your maximum work load should be approximately 20% of the quoted breaking strength. This factor will provide greater safety and extended service life of the winch line. A low working load factor is not only dangerous, but poor economy as it overworks the fibers and shortens the life of the line.

DIELECTRIC PROPERTIES

Samson Stable Braid, Nystron, and Spectron II have been described as a "non-conductor". It is our hope that it is never turned over to a line crew on these terms. It is important to note that most quoted Dielectric Properties are results obtained from new, clean rope, and hold true only under such ideal conditions. Dirt, grease, other foriegn matter and moisture, including humidity, will all alter the non-conductivity/conductivity of this or any other synthetic rope or material.

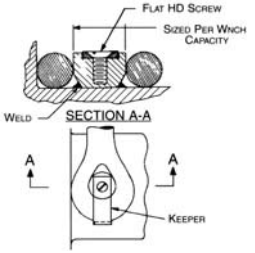
SHARP CUTTING EDGES

Samson winch lines should not be exposed to sharp edges and surface such as metal burrs on Winch Drums, sheaves, shackles, thimbles, wire slings, etc. Samson Winch Lines are made from synthetic fibers, and as such, can be cut and damaged by sharp edges. When installing winch lines on old truck units, great care must be exercised to assure that the rope is not coming in contact with hardware that has been scored and chewed by previously used wire lines. Sheaves, shackles, thimbles, etc. should, in most cases, be replaced. Other metal surfaces should be carefully examined and dressed if necessary.

ATTACHING LINE TO WINCH DRUM

There are various methods of attaching a winch line to a winch drum: the use of a wedge or plug and set screw in the main body of the drum, or "U" bolt through the side of the flange. Another method involves welding a round plug to the winch drum. The soft eye at the bitter end of the winch line is placed over the plug and held in place with a flat keeper which is screwed in flush with the top of the plug. Be sure the attachment method does not have a sharp edge that will cut the line under load. If possible, it is advisable to have an eye splice in both ends of the Winch Line so that it can be reversed in the event of damage to one end. This is not always possible, depending on the method of attachment to the winch drum, and whether or not a closed thimble is spliced into the eye. If an eye is not used at the drum end, then this end should be tightly whipped with a strong twine. Important: The end connection is not designed to carry any load, so at least four wraps should always be kept on the drum.

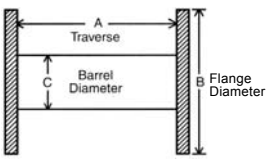
Do not attach end of line to drum by using core only.



DETERMINING LENGTH OF ROPE THAT CAN BE PUT ON A WINCH

The formula for rope capacity on a winch drum is:

Length to be stored = A(B2 - C2)
15.3 x dia of rope 2
A, B, C, and diameter are in inches.

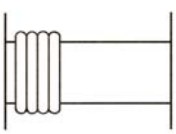


END-FOR-ENDING

It is recommended that every winch line be rotated End-forEnd on a periodic basis. This will vary high stress and wear point and extend useful life. Recommended period is six (6) months, at which time visual inspection and washing can be programmed.

WINDING ROPE ON WINCH DRUM

The first layer (wrap) around winch drum should be put on closely and tightly. Initial winding tension (load) should be approximately 50 pounds. This will prevent subsequent wraps from slipping down between turns when tension is applied. Samson Winch Lines will tend to self-level themselves. IMPORTANT: Recommend at least four wraps always be left on winch drum.



ABRASION PROTECTION OF LINE

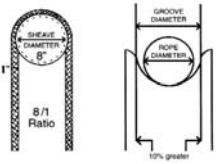
Stable Braid, Nyston, and Spectron II, with their outer jacket of Polyester, have a relatively high degree of resistance to abrasion and fusing. However, all synthetics are subject to fusing if subjected to enough friction and heat, and therefore such practices as surging on a Gypsy head winch, hard rendering around poles or over cross-arms, etc. should be avoided whenever possible.

THE USE OF SLINGS WITH A WINCH LINE

The winch line itself should not be used as a choker to pick up a pole or other objects. The hook attached on the end of the wind line can cut deeply into the rope itself. We recommend a separate line, sling or strap be used as the choker and not the basic winch line itself.

BOOM SHEAVE RECOMMENDATIONS

To assure maximum efficiency and safety, the boom sheave diameter should be no less than eight (8) times the rope diameter. The sheave groove diameter should be no less than 10% greater than the rope diameter, and the groove should be round in shape – not V-shaped.



EYE SPLICING

Eye splices at the end of winch lines, (if not put in at the factory) should be done in strict accordance with the steps and procedures as outlined in the Samson Splicing Manual under "Standard Eye Splice." This splice can be easily learned and executed by line crews and shop personnel. Assistance in splicing instruction is available through Hanes Supply. Training Splicing Kits, manuals, and tools can be ordered through Hanes Supply.

The Standard Eye Splice can't be pulled out under tension; it can, however, be pulled out by hand when in a relaxed state. To prevent such tampering, it is recommended that stich locking or a tight seizing be applied to the base or throat of the splice. When splicing used rope, be sure to refer to the "Special Tips for Splicing Used Rope" in the Splicing Manual.

KNOTS

Splicing is, by far, the strongest and most efficient means of attachment. Knots should never be tied in a winch line if it can in any way be avoided, as knots can reduce the strength of any rope (or wire) as much as 50%. Also, avoid sharp bends in the line where possible as this will also greatly reduce strength.

STITCH LOCKING EYE SPLICES

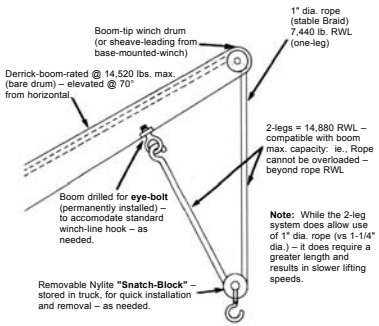
Stitch locking may prove advantageous on some splices to prevent no-load opening due to mishandling.

Material required – about one (1) **fid** length of Nylon Whipping Twine approximately the same size as the strands in the size rope you are stitch locking. The same strands cut from the rope you are stitch locking may also be used, but whipping twine is preferable. Instructions are in the Samson Splicing Manual.

"DOUBLE BLOCK" SYSTEM

For handling heavy loads (up to 14,880 lbs. – pad-mounted transformers, etc.) using 1" diameter Stable Braid winch lines, without exceeding R.W.L. of rope (7,440 lbs.), a Double Block System is recommended.

The system avoids the use of 1-1/4" diameter Stable Braid, which limits capacity of winch drum and/or sheave-size.



NOTE: Unless boom is equipped with "pole-grabber" claws – this system does not work well – when handling and setting poles – as pole can't be snubbed tightly against jaws at end of boom.

The result is that 1" diameter Stable Braid can be used – with a single leg, for most normal lifting operations – (up to 7,440 lbs.) – and for heavy lifts up to 14,880 lbs.) using the double leg system – in both cases, observing approximate recommended work loads.

ULTRAVIOLET – STRENGTH DEGRADATION

Prolonged exposure of synthetic ropes to Ultraviolet Radiation of sunlight causes varying degrees of strength degradation. Some concern has been created by various reports published on this subject (and by erroneous interpretations drawn from these reports).

Polyester fibers are the least affected by ultraviolet exposure, and resulting strength degradation of exposed fibers is negligible.

Nylon is more susceptible to strength loss due to ultraviolet rays; but, with both fibers, the degree of susceptibility to ultraviolet damage is dependent upon the type of fiber, and the various ultraviolet inhibitors with which they are treated by the fiber manufacturer.

The important point to note here is that ultraviolet rays have low penetration in synthetic fibers, thus it is only the outer surface fibers that are affected.

HARMFUL CHEMICALS

Certain chemicals will break down synthetic fibers. To be avoided are sulfuric acids, alkalies, or chlorinate hydrocarbons over 160°F; strong cleaning agents or bleaches may be harmful.

Winch Lines

Hanes SUPPLY, INC.
YOUR SLING AND RIGGING SPECIALIST

CLEANING
Sometimes utilities have adopted the very good practice of carrying at all times, a spare (clean and dry) winch line enclosed in a plastic bag, enabling crews in the field to quickly replace a damaged, soiled or wet winch line. Samson winch lines can be washed in a mild detergent and warm water, rinsed and air-dried. The polyester fibers themselves actually absorb only a negligible amount of water, but water trapped between the fibers should be squeezed out (by placing the line under tension) and air-dried.

SHOCK LOADING
Shock loading of any line – synthetic, manila, or wire – produces a drastically different set of physical properties and results as compared with normal loading. Shock loading, most simply described, is a "jerking" or "snatching" or a line. Or, a very sudden change in tension – from a state of relaxation or low load to one of high load. This results in accelerated wearing.

A typical shock load on a winch line occurs when an object is lifted vertically with a sudden jerk, or when this load is suddenly dropped. A 5,000 pound load, under these conditions, may then "weigh" 30,000 pounds – and break a winch line rated in this strength range.

A 4" sudden drop – as off a platform – can actually double the load. Similarly, an over-wrap "falling off" the winch drum can result in a 50% shock load.

Assume that you have seven identical ropes – each with a 30,000 lb. breaking strength – and you work these ropes daily – each rope lifting a different load, as below – for example, in a winch line application:

	BREAKING STRENGTH	WORKING LOAD	WORKING LOAD FACTOR	NO. OF LIFTS BEFORE FAILURE*
1.	30,000 lbs.	5,000 lbs.	6/1	1,000
2.	30,000 lbs.	6,000 lbs.	5/1	750
3.	30,000 lbs.	7,500 lbs.	4/1	500
4.	30,000 lbs.	10,000 lbs.	3/1	300
5.	30,000 lbs.	15,000 lbs.	2/1	100
6.	30,000 lbs.	20,000 lbs.	1.5/1	25
7.	30,000 lbs.	28,000 lbs.	1.1/1	5

*Relative values only

This illustration clearly shows the higher the Working Load Factor the greater the Service Life, and the lower the replacement factor. Thus, a Working Load Factor also related directly as an "Economy Factor."

Your may turn this around and look at it another way: If you're always lifting the same weight; then, the stronger the rope (and higher the Working Load Factor) – the longer the rope will last.

FATIGUE
Synthetic fibers have a "memory." They function similar to metal (wire) in that they remember and retain the effects of being overloaded and shock loaded. This is an important reason to stress winch line procedures which reduce danger of shock loading... in order to prolong the life of the line and reduce premature down grading. If there is reason to believe that a line has been shock loaded above its recommended working load, it should be logged; and if a number of these occur, the line should be rotated and inspected.

VISUAL INSPECTION
The load-bearing capacity of Samson Stable Braid and Nystron Ropes are divided equally between the inner core and the outer cover – thus, despite damage to the outer cover strands, you have an intact inner core capable of supporting approximately 50% of the applied load... an important reserve safety factor. Spectron II has 100% of its load bearing capacity accomplished by the core.

DISCARD POINT
Continued use and normal wear in the line gradually diminishes the ultimate bearing strength and lowers the factor of safety. In determining the proper discard time of Samson winch lines, the following guides are suggested:

a. If as many as 1/2 of the cover strands are cut at a given point, this damaged section should be cut out. If within 10 feet of the eye, put in a new eye splice. If over 10 feet, rejoin the rope with a Standard End-for-End Splice per the Splice Manual. The rope can then be put back into normal operation. A few damaged strands spaced out along the rope at intervals is no real cause for immediate concern, but should be watched and periodically examined.

b. If the individual cover strands have been worn down after extended use to within 50% of their original bulk over an extended area of the line, then the line should be discarded (or assigned to a less critical task). This can best be determined by an examination and comparison of the bulk of an individual strand which is exposed and subject to wear with the same strand where it crosses under other strands and is protected (and therefore is full size).

c. Another guide for determining discard time is when the rope has a residual strength of 50% of its original new rope strength. This can be determined through laboratory tensile strength break tests. This can be done by Hanes Supply. If utilities wish to perform their own tests, they should contact Hanes Supply to coordinate testing procedure, methods and apparatus. Hanes Supply has instructions on technical procedures for testing braided synthetic ropes.

TRAINING
A Preventative Maintenance and Safety Program in the use of winch lines is strongly recommended. Hanes Supply will assist in this.

Samson winch lines, used and cared for properly, will render years of efficient, economical, and trouble-free service.

Winch line replacements, either in cut lengths or 600 ft. spools are available through Hanes Supply.

Samson Ocean Systems guarantees its products against manufacturing defects, but can't be held responsible for failure or accident due to improper use or failure to observe prescribed procedures for usage, as set forth above. Write to Samson for Guidelines on Care, Usage & Inspection of Rope.

CHARACTERISTICS OF NATURAL AND SYNTHETIC FIBERS

	K-SPEC	ARAMID	NYLON	POLYESTER	HMWPE	POLYPROPYLENE
			FILAMENT TYPE			MULTIFILIMENT
STRENGTH (GRAMS PER DENIER)	27	23	8.0 - 9.0	6.5 - 9.0	27	6.5 - 8.0
SPECIFIC GRAVITY	1.2	1.44	1.14	1.38	.97	.92
ABILITY TO FLOAT	SINKS	SINKS	SINKS	SINKS	FLOATS	FLOATS
ELASTICITY AT STRETCH BREAK	3.6%	3.6%	16%	10 - 12%	3.6%	22 - 28%
MOISTURE ABSORBENCY	.2% OF WEIGHT	.5% OF WEIGHT	9% OF WEIGHT	1% OF WEIGHT	ZERO	ZERO
EFFECT OF HEAT	MELTS AT 300°F	DECOMPOSES AT 800°F	MELTS AT 482°F	MELTS AT 482°F	MELTS AT 297°F	50% TENSILE AT 200° MELTS AT 330°F
EFFECT OF SUNLIGHT ON SLINGS	TPX NONE	TP & SE NONE	WEB UP TO 50%	WEB UP TO 50%	TPX NONE	UP TO 50%
EFFECT OF AGE	NONE	NONE	NONE	NONE	NONE	NEGLIGIBLE
RESISTANCE TO CHEMICALS AND ACIDS	EXCELLENT	GOOD	FAIR	VERY GOOD	EXCELLENT	EXCELLENT
TO AKLALIS	EXCELLENT	GOOD	EXCELLENT	VERY GOOD	EXCELLENT	GOOD
TO SOLVENTS	EXCELLENT	GOOD	GOOD	VERY GOOD	EXCELLENT	GOOD
ROT AND MILDEW	100% RESISTANT	100% RESISTANT	100% RESISTANT	100% RESISTANT	100% RESISTANT	100% RESISTANT
IDENTIFICATION	LIGHT STRONG	DOES NOT BURN	MELTS BEFORE BURNING FORMS HARD BEAD CELERY ODOR.	MELTS BEFORE BURNING FORMS HARD BEAD PUNGENT ODOR.	MELTS BEFORE BURNING HARD TO CUT.	FLOATS. MELTS BEFORE BURNING BURNING ASPHALT ORDOR
ABRASION RESISTANCE	EXCELLENT	GOOD	GOOD	GOOD	EXCELLENT	FAIR

The MSI-7200 Dyna-Link is a versatile digital force measurement and load-indicating instrument for inside and outside use. Ask about remote display options.

MSI-7200
DYNA-LINK

DYNA-LINK SPECIFICATIONS

500 LB. TO 250 TON RANGE

The MSI-3360 Challenger II DigitalCrane Scale is an instrument for light-duty overhead industrial weighing.

MSI-3360
CHALLENGER II

CHALLENGER SPECIFICATIONS

250 LB. TO 15,000 LB. RANGE

"PORTA-WEIGH PLUS" SPECIFICATIONS

500 LB. TO 250 TON RANGE

MSI-4300
"PORTA-WEIGH PLUS"

The MSI-4300 "Porta-Weigh Plus" Overhead Crane Scale has served duty in aerospace, chemical, marine, mining, petroleum, and steel industry applications for heavy-duty use. Ask about the MSI-4260 "Porta-Weigh" for Intrinsically Safe and High Heat applications.

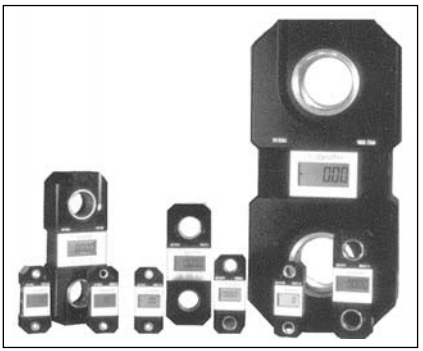
MSI-6260
TRANS-WEIGH

TRANS-WEIGH SPECIFICATIONS

500 LB. TO 250 TON RANGE

The MSI-6260 Trans-Weigh Radio Telemetry Crane Scale provides trouble-free data transmission from crane hook to digital indicator.

WARNING Do not use this product unless properly trained.
Inspect and use according to OSHA B30.9 or Manufacturers Instructions.



GRIPHOIST
DYNAFOR® LLX

The Griphoist Dynafor® LLX with Microprocessor combines digital technology with lightweight, durable aluminum construction for state-of-the-art load monitoring and check-weighing. Output by cable to hand-held display, computer or printer. Operates in extreme atmospheric conditions.

DYNAFOR® LLX SPECIFICATIONS

250 LB. TO 500,000 LB. RANGE

The Griphoist Wireless Dynafor® LLX-TR sends radio signal up to 180 feet away to hand-held display, or optional wall-mounted display or printer.

DYNAFOR® LLX-TR SPECIFICATIONS

250 LB. TO 500,000 LB. RANGE

GRIPHOIST
DYNAFOR® LLX-TR

GUIDELINES FOR SELECTING THE PROPER MODEL

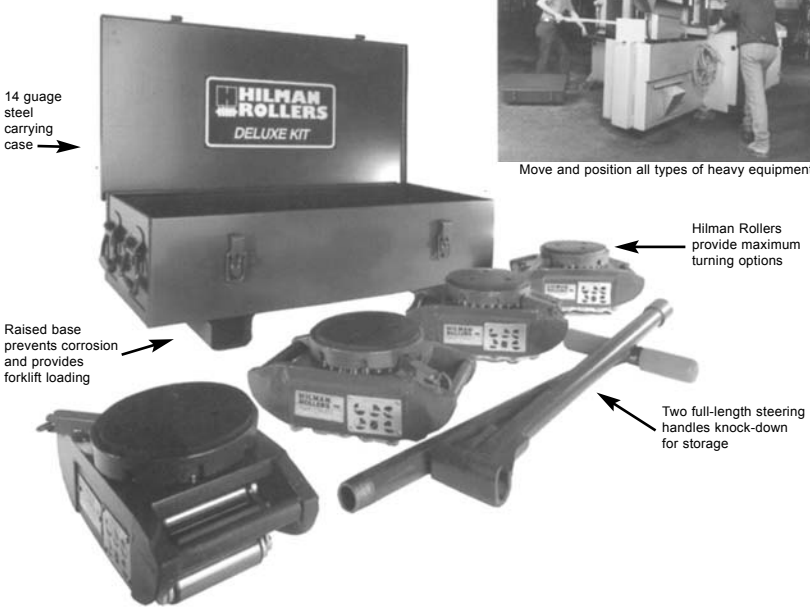
1. How much does the load weigh?
2. How many contact points does the load have? The Hilman rollers are rated in metric tons. Divide the number of contact points into the total load to determine the capacity of individual rollers. Determine if the load is equally distributed or unbalanced. If unbalanced, some rollers may carry more load and some less.
3. What is the rolling surface and its condition? The rolling surface should be hard and level, and free of debris. Where the surface is not hard such as asphalt or dirt, a track or steel plate can be used as the rolling surface. If the surface is not level, there must be a hold-back system on the load to brake and control it. If the floor is composed of a delicate surface, then specify Nyton rollers which are coated to soften the roller contact.
4. Are there turns involved or is it a straight line move? If there are turns, rollers with swivels or swivels with a locking top are suggested. If no turns, then a rigid style top is fine.

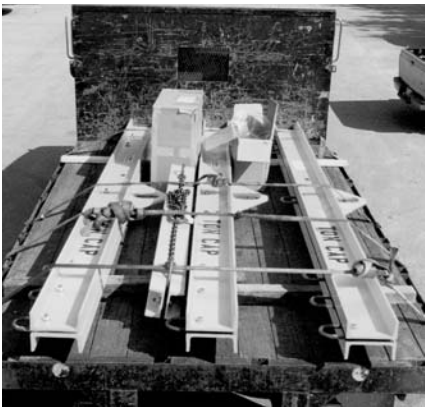
Rollers are available in sizes ranging from 1/2 to 3,000 tons. Riggers kits which consist of four rollers, steering handles and various tops are available if moving loads with rollers is a common task. The kit comes complete with a locking steel box. A riggers set is the same as a kit without the steel box.

HILMAN DELUXE KITS

• Steel or Nyton Chain

Move and position all types of heavy equipment





LIFTER VS SPREADER – THE DIFFERENCE

Lifting beams are used when available headroom is not sufficient for top rigging. Lifting beams must be designed structurally larger than spreader beams to adequately handle load stress. Spreader beams with top rigging are smaller because most load stress is absorbed by the rigging. This differentiation is critical in order to properly specify the equipment required. **Make sure you know the difference.**

DO NOT EXCEED RATED CAPACITY
Can fail if damaged, misused or overloaded. Inspect before use. Use only if trained.
DEATH or INJURY can occur from improper use or maintenance.

WARNING

CROSBY CLIP WARNINGS AND APPLICATION INSTRUCTIONS

G-450
(Red-U-Bolt)

⚠WARNING

- **Failure to read, understand, and follow these instructions may cause death or serious injury.**
- **Read and understand these instructions before using clips.**
- **Prepare wire rope end termination only as instructed.**
- **Do not use with plastic coated wire rope.**
- **Apply first load to test the assembly. This load should be of equal or greater weight than loads expected in use. Next, check and re-tighten nuts to recommended torque. (See Table I, this page).**

Efficiency ratings for wire rope end terminations are based upon the catalog breaking strength of wire rope. The efficiency rating of a properly prepared loop or thimble – eye termination for clip sizes 1/8" through 7/8" is 80%, and for sizes 1" through 3-1/2" is 90%.

The number of clips shown (see Table I) is based upon using RRL or RLL wire rope, 6 x 19 or 6 x 37 Class, FC or IWRC; IPS or XIP. If Seale construction or similar large outer wire type construction in the 6 x 19 Class is to be used for sizes 1" and larger, add one additional clip. If a pulley (sheave) is used for turning back the wire rope, add one additional clip.

The number of clips shown also applies to rotation-resistant RRL wire rope, 8 x 19 Class, IPS, XIP, sizes 1-1/2" and smaller; and to rotation-resistant RRL wire rope, 19 x 7 Class IPS, XIP, sizes 1-3/4" and smaller.

For elevator, personnel hoist, and scaffold applications, refer to ANSI A17.1 and ANSI A10.4. These standards do not recommend U-Bolt style wire rope clip terminations. The style wire rope termination used for any application is the obligation of the user.

For OSHA (Construction) applications, see OSHA 1926.251.

1.

Refer to Table I following these instructions. Turn back specified amount of rope from thimble or loop. Apply first clip one base width from dead end of rope. Apply U-Bolt over dead end of wire rope – live end rests in saddle. Tighten nuts evenly, alternate from one nut to the other until reaching the recommended torque.

2.

When two clips are required, apply the second clip as near the loop or thimble as possible. Tighten nuts evenly, alternating until reaching the recommended torque. When more than two clips are required, apply the second clip as near the loop or thimble as possible, turn nuts on second clip firmly, but do not tighten. Proceed to Step 3.

3.

When three or more clips are required, space additional clips equally between first two – take up rope slack – tighten nuts on each U-Bolt evenly, alternating from one nut to the other until reaching recommended torque.

IMPORTANT

Apply first load to test the assembly. This load should be of equal or greater weight than loads expected in use. Next, check and retighten nuts to recommended torque. In accordance with good rigging and maintenance practices, the wire rope end termination should be inspected periodically for wear, abuse, and general adequacy.

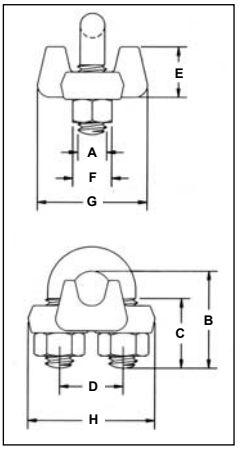
TABLE I

CLIP SIZE (IN.)	MINIMUM NO. OF CLIPS	AMOUNT OF ROPE TO TURN BACK IN INCHES	*TORQUE IN FT. (LBS)
1/8	2	3-1/4	4.5
3/16	2	3-3/4	7.5
1/4	2	4-3/4	15
5/16	2	5-1/4	30
3/8	2	6-1/2	45
7/16	2	7	65
1/2	3	11-1/2	65
9/16	3	12	95
5/8	3	12	95
3/4	4	18	130
7/8	4	19	225
1	5	26	225
1-1/8	6	34	225
1-1/4	7	44	360
1-3/8	7	44	360
1-1/2	8	4	360
1-5/8	8	58	430
1-3/4	8	61	590
2	8	71	750
2-1/4	8	73	750
2-1/2	9	84	750
2-3/4	10	100	750
3	10	106	1200
3-1/2	12	149	1200

If a pulley (sheave) is used for turning back the wire rope, add one additional clip.

If a greater number of clips are used than shown in the table, the amount of turnback should be increased proportionately.

*The tightening torque values shown are based upon the threads being clean, dry, and free of lubrication.



CROSBY® CLIPS

- Sizes 1/8" through 3" have forged bases
- Entire clip – hot dip galvanized to resist corrosive and rusting action.
- Only genuine Crosby clips have a red U-BOLT for instant recognition.
- All clips are individually bagged or tagged with proper application instructions and warning information.
- Clip sizes up through 1-1/2" have rolled threads.

Look for the Red-U-Bolt®, your assurance of Crosby Clips.

G-450

SEE APPLICATION AND WARNING INFORMATION

Crosby clips all sizes 1/4" and larger meet Federal Specification FF-C-450 TYPE 1 CLASS 1.

ROPE SIZE (IN)	G-450 STOCK NO. GALV.	STD. PKG. QTY.	WT. PER 100 (LBS)	DIMENSIONS (IN)							
				A	B	C	D	E	F	G	H
*1/8	1010015	100	6	.22	.72	.44	.47	.41	.38	.81	.94
*3/16	1010033	100	10	.25	.97	.56	.59	.50	.44	.94	1.16
1/4	1010051	100	20	.31	1.03	.50	.75	.66	.56	1.19	1.44
5/16	1010079	100	30	.38	1.38	.75	.88	.72	.69	1.31	1.69
3/8	1010097	100	47	.44	1.50	.75	1.00	.91	1.63	1.94	.75
7/16	1010113	50	76	.50	1.88	1.00	1.19	1.13	.88	1.81	2.28
1/2	1010131	50	80	.50	1.88	1.00	1.19	1.13	.88	1.91	2.28
9/16	1010159	50	104	.56	2.25	1.25	1.31	1.22	.94	2.06	2.50
5/8	1010177	50	106	.56	2.38	1.25	1.31	1.34	.94	2.06	2.50
3/4	1010195	25	142	.62	2.75	1.44	1.50	1.41	1.06	2.25	2.84
7/8	1010211	25	212	.75	3.12	1.62	1.75	1.59	1.25	2.44	3.16
1	1010239	10	252	.75	3.50	1.81	1.88	1.78	1.25	2.63	3.47
1-1/8	1010257	10	283	.75	3.88	2.00	2.00	1.91	1.25	2.81	3.59
1-1/4	1010275	10	438	.88	4.25	2.13	2.31	2.19	1.44	3.13	4.13
1-3/8	1010293	10	442	.88	4.63	2.31	2.38	2.31	1.44	3.13	4.19
1-1/2	1010319	10	544	.88	4.94	2.38	2.59	2.44	1.44	3.41	4.44
1-5/8	1010337	Bulk	704	1.00	5.31	2.62	2.75	2.66	1.63	3.63	4.75
1-3/4	1010355	Bulk	934	1.13	5.75	2.75	3.06	2.94	1.81	3.81	5.28
2	1010373	Bulk	1300	1.25	6.44	3.00	3.38	3.28	2.00	4.44	5.88
2-1/4	1010391	Bulk	1600	1.25	7.13	3.19	3.88	3.19	2.00	4.50	6.38
2-1/2	1010417	Bulk	1900	1.25	7.69	3.44	4.13	3.69	2.00	4.05	6.63
†2-3/4	1010435	Bulk	2300	1.25	8.31	3.56	4.38	4.88	2.00	5.00	6.88
3	1010453	Bulk	3100	1.50	9.19	3.88	4.75	4.69	2.38	5.88	7.63
†31/2	1010426	Bulk	4000	1.50	10.75	4.50	5.50	6.00	2.38	6.19	8.38

*Electro-plated U-Bolt and Nuts
†2-3/4" and 3-1/2" are made of cast steel.

MASTER LINK

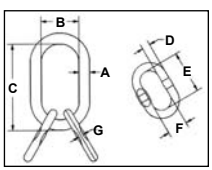
- Alloy Steel - Quenched and Tempered.
- Individually proof tested at 2 times Working Load Limit with certification.
- Proof test certification shipped with each link.
- Sizes from 1/2" to 2" are drop forged.

QUIC-CHECK™

A-342

SIZE (IN)	A-342 STOCK NO. S.C.	WLL*† (LBS)	WT. EACH (LBS)	DIMENSIONS (IN)					DEFORMATION INDICATOR
				A	B	C	D	E	
1/2	1014262	7000	.82	.50	2.50	5.00	3.50	6.00	3.00
5/8	1014280	9000	1.52	.63	3.00	6.00	4.25	7.25	3.50
3/4	1014306	12300	2.07	.75	2.75	5.50	4.25	7.00	3.50
1	1014324	24360	4.85	1.00	3.50	7.00	5.50	9.00	4.50
1-1/4	1014342	36000	9.57	1.25	4.38	8.75	6.88	11.25	5.50
1-1/2	1014360	54300	16.22	1.50	5.25	10.50	8.25	13.50	6.50
1-3/4	1014388	84900	25.22	1.75	6.00	12.00	9.50	15.50	7.50
2	1014404	102600	37.04	2.00	7.00	14.00	11.00	18.00	9.00
2-1/4††	1014422	143100	54.10	2.25	8.00	16.00	12.50	20.50	–
2-1/2††	1014468	147300	67.75	2.50	8.00	16.00	13.00	21.00	–
2-3/4††	1014440	216900	87.70	2.75	9.50	16.00	15.00	21.50	–
3††	1014486	228000	115.00	3.00	9.00	18.00	15.00	24.00	–
3-1/4††	1014501	262200	145.00	3.25	10.00	20.00	16.50	26.50	–
3-1/2††	1014529	279000	200.00	3.50	12.00	24.00	19.00	31.00	–
3-3/4††	1015051	336000	198.00	3.75	10.00	20.00	17.50	27.50	–
4††	1015060	373000	228.00	4.00	10.00	20.00	18.00	28.00	–
4-1/4††	1015067	354000	302.00	4.25	12.00	24.00	20.50	32.50	–
4-1/2††	1015079	360000	345.00	4.50	14.00	28.00	23.00	37.00	–
4-3/4††	1015088	389000	436.00	4.75	14.00	28.00	23.50	37.50	–
5††	1015094	395000	516.00	5.00	15.00	30.00	25.00	40.00	–

*Minimum Ultimate Load is 5 times Working Load Limit.
†Based on single leg sling (in-line load), or resultant load on muliple legs with an included angle less than or equal to 120°. For use with chain slings.
††Welded Master Link.



MASTER LINK ASSEMBLY

- Alloy Steel - Quenched and Tempered.
- Individually proof tested at 2 times Working Load Limit with certification.
- Proof test certification shipped with each link.

A-345

SIZE (IN)	A-345 STOCK NO. S.C.	WLL*† (LBS)	WT. EACH (LBS)	DIMENSIONS (IN)						DEFORMATION INDICATOR
				A	B	C	D	E	F	
3/4	1014734	10500	2.60	.75	2.75	5.50	.56	3.55	1.57	3.50
1	1014752	24360	6.10	1.00	3.50	7.00	.69	3.94	2.36	4.50
1-1/4	1014770	36000	13.20	1.25	4.38	8.75	.88	3.94	2.36	5.50
1-1/2	1014798	54300	24.20	1.50	5.25	10.50	1.15	5.91	2.76	6.50
1-3/4	1014814	84900	35.60	1.75	6.00	12.00	1.25	6.30	3.54	7.50
2	1014832	102600	57.30	2.00	7.00	14.00	1.50	7.09	3.94	9.00

*Working Load Limit with coupling links at 60° included angle.
†Ultimate Load is 4 times Working Load Limit.

SCREW PIN

- Working load limit permanently shown on every shackle.
- Forged – Quenched and Tempered, with alloy pins.
- Capacities 1/3 through 55 tons.
- Look for the red pin...the mark of genuine Crosby quality.
- Shackles can be furnished proof tested with certificates to designated standards such as ABS, DNV, Lloyds, or other certification available when requested at the time of order.
- Hot dip galvanized or self-colored.
- Fatigue rated.

ROUND PIN

G-209 S-209

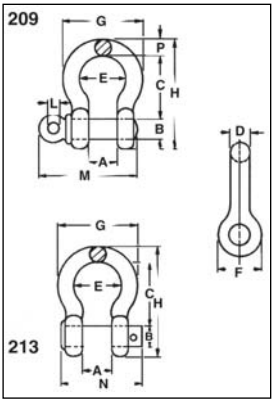
Screw pin anchor shackles meet the requirements of Federal Specification RR-C-271D Type IVA, Grade A, Class 2.

Load Rated

G-213 S-213

Round pin anchor shackles meet the requirements of Federal Specification RR-C-271D Type IVA, Grade A, Class 1.

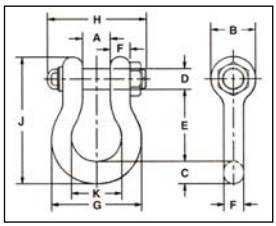
NOM. SIZE (IN.)	WORKING LOAD LIMIT* (TONS)	STOCK NO.				WEIGHT EACH (LBS)	
		G-209 GALV.	S-209 S.C.	G-213 GALV.	S-213 S.C.	G-209 S-209	G-213 S-213
3/16	†1/3	1018357	–	–	–	.06	–
1/4	1/2	1018375	1018384	1018017	1018026	.10	.13
5/16	3/4	1018393	1018400	1018035	1018044	.19	.18
3/8	1	1018419	1018428	1018053	1018062	.31	.29
7/16	1-1/2	1018437	1018446	1018071	1018080	.38	.38
1/2	2	1018455	1018464	1018099	1018106	.72	.71
5/8	3-1/4	1018473	1018482	1018115	1018124	1.37	1.50
3/4	4-3/4	1018491	1018507	1018133	1018142	2.35	2.32
7/8	6-1/2	1018516	1018525	1018151	1018160	3.62	3.49
1	8-1/2	1018534	1018543	1018179	1018188	5.03	5.00
1-1/8	9-1/2	1018552	1018561	1018197	1018204	7.41	6.97
1-1/4	12	1018570	1018589	1018213	1018222	9.50	9.75
1-3/8	13-1/2	1018598	1018605	1018231	1018240	13.53	13.25
1-1/2	17	1018614	1018623	1018259	1018268	17.20	17.25
1-3/4	25	1018632	1018641	1018277	1018286	27.75	29.46
2	35	1018650	1018669	1018295	1018302	45.00	45.75
2-1/2	†55	1018678	1018687	–	–	85.75	–



NOM. SIZE	WORKING LOAD LIMIT*	DIMENSIONS (IN)												TOLERANCE + / -	
		A	B	C	D	E	F	G	H	L	M	N	P	C	A
3/16	†1/3	.38	.25	.88	.19	.60	.56	.98	1.47	.16	1.12	–	.19	.06	.06
1/4	1/2	.47	.31	1.13	.25	.78	.61	1.28	1.84	.19	1.38	1.34	.25	.06	.06
5/16	3/4	.53	.38	1.22	.31	.84	.75	1.47	2.09	.22	1.66	1.59	.31	.06	.06
3/8	1	.66	.44	1.44	.38	1.03	.91	1.78	2.49	.25	2.03	1.88	.38	.13	.06
7/16	1-1/2	.75	.50	1.69	.44	1.16	1.06	2.03	2.91	.31	2.38	2.13	.44	.13	.06
1/2	2	.81	.63	1.88	.50	1.31	1.19	2.31	3.28	.38	2.69	2.38	.50	.13	.06
5/8	3-1/4	1.06	.75	2.38	.63	1.69	1.50	2.94	4.19	.44	3.34	2.91	.69	.13	.06
3/4	4-3/4	1.25	.88	2.81	.75	2.00	1.81	3.50	4.97	.50	3.97	3.44	.81	.25	.06
7/8	6-1/2	1.44	1.00	3.31	.88	2.28	2.09	4.03	5.83	.50	4.50	3.81	.97	.25	.06
1	8-1/2	1.69	1.13	3.75	1.00	2.69	2.38	4.69	6.56	.56	5.07	4.53	1.06	.25	.06
1-1/8	9-1/2	1.81	1.25	4.25	1.16	2.91	2.69	5.16	7.47	.63	5.59	5.13	1.25	.25	.06
1-1/4	12	2.03	1.38	4.69	1.29	3.25	3.00	5.75	8.25	.69	6.16	5.50	1.38	.25	.06
1-3/8	13-1/2	2.25	1.50	5.25	1.42	3.63	3.31	6.38	9.16	.75	6.84	6.13	1.50	.25	.13
1-1/2	17	2.38	1.63	5.75	1.54	3.88	3.63	6.88	10.00	.81	7.35	6.50	1.62	.25	.13
1-3/4	25	2.88	2.00	7.00	1.84	5.00	4.19	8.86	12.34	1.00	9.08	7.75	2.25	.25	.13
2	35	3.25	2.25	7.75	2.08	5.75	4.71	9.97	13.68	1.22	10.34	8.75	2.40	.25	.13
2-1/2	†55	4.13	2.75	10.50	2.71	7.25	5.69	12.87	17.84	1.38	13.00	–	3.13	.25	.25

*NOTE: Maximum Proof Load is 2.0 times the Working Load Limit. Minimum Ultimate Strength is 6 times the Working Load Limit.
†Furnished in screw pin only.

BOLT-TYPE ANCHOR SHACKLE



Load Rated

"QT"
QUENCHED & TEMPERED

G-2140 S-2140

NOM. SHACKLE SIZE (IN.)	WORKING LOAD LIMIT* (TONS)	STOCK NO.		WEIGHT EACH (LBS.)
		G-2140 GALV	S-2140 S.C.	
1-1/2	30	1021110	1021129	20.8
1-3/4	40	1021138	1021147	33.9
2	55	1021156	1021165	52.0
2-1/2	85	1021174	1021183	96.0
3	120	1021192	–	178.0
3-1/2	†150	1021218	–	265.0
4	†175	1021236	–	338.0
4-3/4**	†200	1021414	–	450.0
5**	†250	1021432	–	600.0
6**	†300	1021450	–	775.0
7**	†400	1021478	–	1102.0

- Working Load Limit is permanently shown on every shackle.
- Alloy bows, alloy bolts.
- Quenched and tempered.
- Sizes 200 tons and larger are individually proof tested.
- Forged Alloy Steel 30 through 175 metric tons. Cast Alloy Steel 200 through 400 metric tons.
- Pins are galvanized and painted red.

NOM. SHACKLE SIZE (IN.)	WORKING LOAD LIMIT* (TONS)	DIMENSIONS (IN)										TOLERANCE + / -	
		A	B	C	D	E	F	G	H	J	K	A	E
1-1/2	30	2.38	3.62	1.62	1.63	5.75	1.50	6.88	7.94	10.00	3.88	.13	.25
1-3/4	40	2.88	4.31	2.25	2.00	7.00	1.75	8.50	9.31	12.22	5.00	.13	.25
2	55	3.25	4.81	2.40	2.25	7.75	2.00	9.75	10.41	13.28	5.75	.13	.25
2-1/2	85	4.12	5.69	3.12	2.75	10.50	2.62	12.50	13.56	17.34	7.25	.25	.25
3	†120	5.00	6.50	3.62	3.25	12.98	3.00	14.50	16.50	21.50	7.88	.25	.25
3-1/2	†150	5.25	8.00	4.12	3.75	14.63	3.50	16.50	19.00	24.62	9.00	.25	.25
4	†175	5.50	9.00	4.56	4.25	14.50	4.00	18.38	19.75	25.69	10.00	.25	.25
4-3/4**	†200	7.25	10.50	6.00	4.75	15.50	3.75	21.00	19.88	29.25	11.00	.25	.25
5**	†250	8.25	12.00	6.50	5.00	20.00	4.00	24.50	21.12	35.00	13.00	.25	.25
6**	†300	8.38	12.00	6.75	6.00	19.50	5.25	25.00	22.88	35.25	13.00	.25	.25
7**	†400	8.25	14.00	7.25	7.00	22.50	6.50	26.00	26.12	40.25	13.00	.25	.25

*NOTE: Maximum Proof Load is 2.0 times the Working Load Limit. Minimum Ultimate Load is 4 times the Working Load Limit on 200 through 400 metric tons. For sizes 30 throught 175 metric tons, Minimum Ultimate Load is 5.4 times the Working Load Limit.

**Cast Alloy Steel.

†Furnished with Round Head Bolts with welded handle.

††Maximum Proof Load is 1000 tons and furnished with Round Head Bolts with welded handle.

BOLT-TYPE ANCHOR SHACKLE

G-2130 S-2130

Bolt Type Anchor shackles with thin head bolt–nut with cotter pin, meets the requirements of Federal Specification RR-C-271D Type IVA, Grade A, Class 3.

- Working Load Limit is permanently shown on every shackle.
- Forged – quenched and tempered, with alloy pins.
- Capacities 1/3 through 150 metric tons.
- Look for the red pin... the mark of genuine Crosby quality.
- Shackles can be furnished proof tested with certificates to designated standards, such as ABS, DNV, Lloyds, or other certification. Charges for proof testing and certification available when requested at time of order.
- Hot dip galvanized or self colored.
- Fatigue rated.

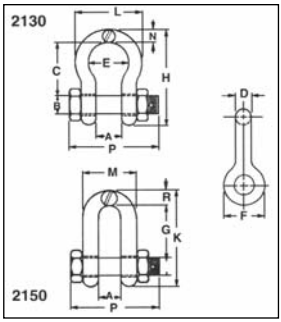
BOLT-TYPE CHAIN SHACKLE

G-2150 S-2150

Bolt Type Chain shackles with thin hex head bolt–nut with cotter pin, meets the requirements of Federal Specification RR-C-271D Type IVB, Grade A, Class 3.

NOM. SHACKLE SIZE (IN.)	WORKING LOAD LIMIT* (TONS)	STOCK NO. G-2130 GALV.	STOCK NO. A-21E0 S.C.	STOCK NO. G-2150 GALV.	STOCK NO. A-2150 S.C.	2130 WEIGHT EACH (LBS.)	2150 WEIGHT EACH (LBS.)
3/16	1/3	1019464	–	–	–	.06	–
1/4	1/2	1019466	–	1019768	–	.11	.13
5/16	3/4	1019468	–	1019770	–	.22	.23
3/8	1	1019470	–	1019772	–	.33	.33
7/16	1-1/2	1019471	–	1019774	–	.49	.49
1/2	2	1019472	1019481	1019775	1019784	.79	.75
5/8	3-1/4	1019490	1019506	1019793	1019800	1.68	1.47
3/4	4-3/4	1019515	1019524	1019819	1019828	2.72	2.52
7/8	6-1/2	1019533	1019542	1019837	1019846	3.95	3.85
1	8-1/2	1019551	1019560	1019855	1019864	5.66	5.55
1-1/8	9-1/2	1019579	1019588	1019873	1019882	8.27	7.60
1-1/4	12	1019597	1019604	1019891	1019908	11.71	10.81
1-3/8	13-1/2	1019613	1019622	1019917	1019926	15.83	13.75
1-1/2	17	1019631	1019640	1019935	1019944	20.80	18.50
1-3/4	25	1019659	1019668	1019953	1019962	33.91	31.40
2	35	1019677	1019686	1019971	1019980	52.25	46.75
2-1/2	55	1019695	1019702	1019999	1020004	98.25	85.00
3	†85	1019711	–	1020013	–	154.00	124.25
3-1/2	†120	1019739	–	–	–	265.00	–
4	†150	1019757	–	–	–	338.00	–

Load Rated



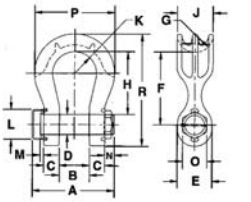
NOM. SHACKLE SIZE (IN.)	WORKING LOAD LIMIT* (TONS)	DIMENSIONS (IN) A	B	C	D	E	F	G	H	K	L	M	N	P	R	TOLERANCE + / - C&G	A
3/16	1/3	.38	.25	.88	.19	.60	.56	–	1.47	–	.98	–	.19	1.29	–	.06	.06
1/4	1/2	.47	.31	1.13	.25	.78	.61	–	1.84	–	1.28	–	.25	1.56	–	.06	.06
5/16	3/4	.53	.38	1.22	.31	.84	.75	–	2.09	–	1.47	–	.31	1.82	–	.06	.06
3/8	1	.66	.44	1.44	.38	1.03	.91	–	2.49	–	1.78	–	.38	2.17	–	.13	.06
7/16	1-1/2	.75	.50	1.69	.44	1.16	1.06	–	2.91	–	2.03	–	.44	2.51	–	.13	.06
1/2	2	.81	.63	1.88	.50	1.31	1.19	1.63	3.28	3.03	2.31	1.81	.50	3.03	.50	.13	.06
5/8	3-1/4	1.06	.75	2.38	.63	1.69	1.50	2.00	4.22	3.75	2.94	2.31	.69	3.63	.63	.13	.06
3/4	4-3/4	1.25	.88	2.81	.75	2.00	1.81	2.38	4.97	4.53	3.50	2.75	.81	4.44	.81	.25	.06
7/8	6-1/2	1.44	1.00	3.31	.88	2.28	2.09	2.81	5.83	5.33	4.03	3.19	.97	5.00	.97	.25	.06
1	8-1/2	1.69	1.13	3.75	1.00	2.69	2.38	3.19	6.56	5.94	4.69	3.69	1.00	5.69	1.00	.25	.06
1-1/8	9-1/2	1.81	1.25	4.25	1.13	2.91	2.69	3.56	7.47	6.78	5.16	4.06	1.25	6.41	1.25	.25	.06
1-1/4	12	2.03	1.38	4.69	1.25	3.25	3.00	3.94	8.28	7.50	5.75	4.53	1.38	6.97	1.38	.25	.06
1-3/8	13-1/2	2.25	1.50	5.25	1.38	3.63	3.31	4.44	9.16	8.28	6.38	5.00	1.50	7.69	1.50	.25	.13
1-1/2	17	2.38	1.63	5.75	1.50	3.88	3.63	4.88	10.00	9.06	6.88	5.38	1.62	8.25	1.62	.25	.13
1-3/4	25	2.88	2.00	7.00	1.75	5.00	4.19	5.75	12.22	10.97	8.50	6.38	2.12	9.59	2.12	.25	.13
2	35	3.25	2.25	7.75	2.00	5.75	4.81	6.75	13.28	12.28	9.75	7.25	2.40	11.00	2.00	.25	.13
2-1/2	55	4.13	2.75	10.50	2.62	7.25	5.69	8.00	17.34	14.84	12.50	9.13	3.13	13.69	2.62	.25	.25
3	†85	5.00	3.25	13.00	3.00	7.88	6.50	8.50	21.50	16.88	14.50	11.00	3.62	16.50	3.50	.25	.25
3-1/2	†120	5.25	3.75	14.63	3.50	9.00	8.00	–	24.63	–	16.50	–	4.12	19.00	–	.25	.25
4	†150	5.50	4.25	14.50	4.00	10.00	9.00	–	25.69	–	18.38	–	4.56	19.75	–	.25	.25

"WIDE BODY" SLING SAVER SHACKLES INCREASE SLING LIFE

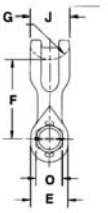
G-2160

Patented

- Greatly improves wearability of wire rope slings.
- Increase in shackle bow radius provides minimum 58% gain in sling bearing surface and eliminates need for a thimble.
- Increases usable sling strength minimum of 15%.
- Pin is non-rotating, with weld on handles for easier use.
- All ratings are in metric tons, embossed on side of bow.
- Sizes 400 tons and larger are tested to 1.33 times Working Load Limit.
- Standard 2160 shackles 400 tons and larger are individually proof tested with Crosby certification. Shackles requiring ABS, DNV, Lloyds and other certifications are available upon special request and must be specified at time of order.
- Weighs no more than conventionally designed shackles.
- All sizes quenched and tempered for maximum strength.
- Forged alloy steel from 75 through 300 metric tons.
- Cast alloy steel from 400 through 1000 metric tons.
- All bows are furnished Dimetcoted. All pins are Dimetcoted then painted red.



400 THROUGH 1000 METRIC TONS



75 THROUGH 300 METRIC TONS

CONVENTIONAL SHACKLE

"WIDE BODY" SHACKLE

"QT" QUENCHED & TEMPERED

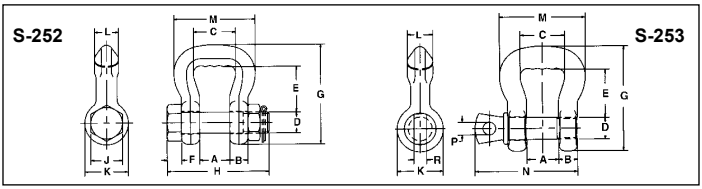
Load Rated

WLL* (METRIC TONS)	G-2160 STOCK NO.	WT. EACH (LBS)	DIMENSIONS (IN)															
			A	B +/-.25	C	D +/-.02	E	F	G	H	J	K	L	M	N	O	P	R
75†	1021290	99	13.62	4.13	2.12	2.76	4.76	12.80	2.52	11.41	4.72	3.66	4.37	1.00	3.00	3.90	12.32	18.31
125†	1021307	161	15.75	5.12	2.56	3.15	5.71	15.94	3.15	14.37	5.90	4.33	5.12	1.06	2.95	4.64	14.96	22.68
200†	1021316	500	20.00	5.90	3.35	4.13	7.28	20.96	4.33	18.90	8.07	5.41	6.69	1.26	4.33	5.75	19.49	29.82
300†	1021325	811	23.27	7.28	4.00	5.25	9.25	26.25	5.51	23.62	10.43	6.31	8.07	1.50	4.42	6.89	23.64	37.39
400††	1021334	1041	28.13	8.66	5.16	6.30	11.02	25.79	6.30	22.64	12.60	7.28	9.45	1.50	4.72	7.76	27.16	38.78
500††	1021343	1378	31.87	9.84	5.59	7.09	12.52	28.35	6.69	24.80	13.39	8.86	10.43	1.61	4.92	8.74	31.10	42.72
600††	1021352	1833	35.94	10.83	6.04	7.87	13.78	31.50	7.28	27.56	14.57	9.74	11.93	1.75	5.39	9.74	34.06	47.24
700††	1021361	2446	39.07	11.81	6.59	8.46	14.80	33.17	7.87	28.94	15.75	10.63	12.62	1.89	5.94	10.75	37.01	50.18
800††	1021254	3016	38.82	12.80	7.19	9.06	15.75	34.06	8.27	29.53	16.54	10.92	13.90	1.89	6.14	11.26	38.39	52.09
900††	1021389	3436	41.34	13.78	7.78	9.84	16.93	34.74	8.66	29.80	17.32	11.52	15.20	2.01	6.08	12.50	40.35	54.04
1000††	1021370	4022	46.30	14.96	8.33	10.63	17.72	35.24	9.06	29.92	18.11	12.11	16.00	2.01	5.98	12.99	42.32	55.31

*Ultimate Load is 5 times the Working Load Limit.
†Forged Alloy Steel. Proof Load is 2 times the Working Load Limit.
††Cast Alloy Steel. Proof Load is 1.33 times the Working Load Limit.

"Synthetic Sling Saver" Shackle

SLING SAVER SHACKLES INCREASE SLING LIFE



The Crosby "Synthetic Sling Saver" Shackle, designed for Round or Flat Synthetic Slings, has the following features:

- Eliminates "bunching" effect caused by traditional shackles.
- Reduces sling tendency to slide.

Increased radius of bow gives wider sling bearing surface resulting in an increased area for load distribution, thus:

- Increases Synthetic Sling efficiency by at least 15% as compared to a standard anchor or chain shackle bow.
- Allowing better load distribution on internal fibers.

Both a Screw Pin and Bolt, nut and cotter pin configuration.

- Bolt (Pin) has a large diameter that provides better load distribution.

Each shackle has a Product Identification Code (PIC) for material traceability along with a Working Load Limit and the name Crosby forged into it.

- Available in sizes from 3-1/4 tons (1") to 50 tons (6").
- All Alloy construction.
- Design Factor of 5 to 1.
- Fatigue rated to 20,000 cycles at 1-1/2 times the Working Load Limit.

S-252

S-253

ROUND SLING SIZE (NUMBER)	WEB SLING NOMINAL SIZE (IN.)	WORKING LOAD LIMIT* (TONS)	S-252 BOLT TYPE		S-253 SCREW PIN	
			S-252 STOCK NO.	WEIGHT EACH (LBS.)	S-253 STOCK NO.	WEIGHT EACH (LBS.)
1 & 2	1	3-1/4	1020485	1.4	1020575	1.4
3 & 4	1.5	6-1/2	1020496	2.4	1020575	2.2
5 & 6	2	8-3/4	1020507	4.1	1020593	3.8
7 & 8	3	12-1/2	1020518	8.0	1020602	7.3
9 & 10	4	20-1/2	1020529	16.9	1020611	15.2
11 & 12	5	35	1020540	35.0	1020620	30.8
13	6	50	1020551	57.5	1020629	52.0

Load Rated

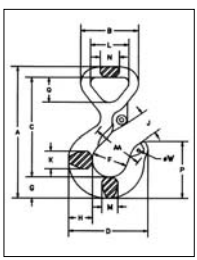
ROUND SLING SIZE (NUMBER)	WEB SLING NOMINAL SIZE (IN.)	WORKING LOAD LIMIT* (TONS)	DIMENSIONS (IN.)														
			A	B	C	D	E	F	G	H	J	K	L	M	N	P	R
1 & 2	1	3-1/4	.88	.62	1.38	.75	1.50	.44	3.38	3.68	1.12	1.50	.75	2.69	3.22	.44	1.00
3 & 4	1.5	6-1/2	1.25	.75	1.75	.88	1.88	.50	4.15	4.25	1.31	1.81	1.00	3.38	4.03	.50	1.19
5 & 6	2	8-3/4	1.38	.88	2.25	1.00	2.81	.56	5.50	4.72	1.50	2.09	1.12	4.19	4.50	.50	1.44
7 & 8	3	12-1/2	1.62	1.12	3.25	1.25	3.06	.75	6.34	5.88	1.88	2.62	1.38	5.62	5.59	.62	1.81
9 & 10	4	20-1/2	2.12	1.38	4.50	1.50	5.75	.88	9.75	7.19	2.25	3.12	1.75	7.50	6.88	.75	2.13
11 & 12	5	35	2.50	1.75	5.50	2.00	6.34	1.12	11.50	9.31	3.00	4.19	2.25	9.19	8.66	1.00	2.88
13	6	50	3.00	2.12	6.50	2.25	7.70	1.25	16.75	10.38	3.38	4.75	2.75	11.00	10.22	1.22	3.19

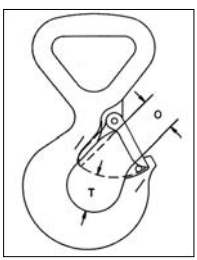
*Note: Maximum Proof Load is 2-1/2 times the Working Load Limit. Minimum Ultimate Strength is 5 times the Working Load Limit.

WEB SLING HOOK

The Web Sling hook, originally designed for 2-Ply Web slings, can also be used with Round Slings as long as the Working Load Limit ratings are compatible. The new hook incorporates the following features:

- ✓ Eye is desigend with a wide beam surface which:
  - Eliminates bunching effects
  - Reduces sling tendency to slide.
  - Allows a better load distribution on internal fibers.
- ✓ Each hook has a Product Identification Code (PIC) for material traceability along with a working load limit.
- ✓ Hooks available in sizes 1-1/2 (1"), 3 (2"), and 5 (3") tons.
- ✓ All alloy construction.
- ✓ Design factor of 5 to 1.
- ✓ Fatigue rated to 20,000 cycles at 1-1/2 times the Working Load Limit.





WS-320 A
WEB SLING HOOK

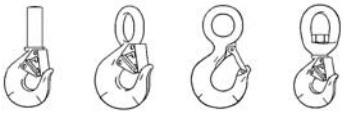
WEB SLING NOMINAL SIZE (IN.)	ROUND SLING SIZE (NUMBER)	WORKING LOAD LIMIT* (TONS)	HOOK I.D. CODE	WS-320 A S.C STOCK NO.	WSL-320 A WITH LATCH STOCK NO.	S-4320 REPLACEMENT LATCH KIT STOCK NO.
1"	1	1-1/2	FA	1022701	1022706	1096374
2"	2	3	HA	1022712	1022717	1096468
3"	3	5	IA	1022723	1022728	1096515

WEB SLING NOMINAL SIZE (IN.)	ROUND SLING SIZE (NUMBER)	WORKING LOAD LIMIT* (TONS)	DIMENSIONS (IN.)																	WEIGHT EACH (LBS.)
			A	B	C	D	F	G	H	J	K	L	M	N	O	P	Q	T	AA	
1"	1	1-1/2	5.25	2.26	3.98	3.11	1.38	.84	.94	.93	.71	1.50	.63	.75	.91	2.24	1.01	.98	2.00	1.10
2"	2	3	7.11	3.66	5.31	3.97	1.63	1.13	1.32	1.13	.94	2.50	.85	1.13	1.09	2.82	1.69	1.16	2.00	2.86
3"	3	5	9.33	5.13	7.06	4.81	2.00	1.44	1.63	1.47	1.31	3.75	1.13	1.63	1.36	3.51	2.59	1.53	2.50	6.60

*Note: Proof load is 2-1/2 times Working Load Limit. Average straightening load (ultimate load) is 5 time Working Load Limit.

SLING AND HOIST HOOKS

WARNINGS AND APPLICATION INSTRUCTIONS



S-319 S-320 S-320N S-322

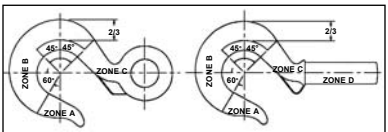
Important Safety Information – Read and Follow

- A visual periodic inspection for cracks, nicks, wear, gouges and deformation as part of a comprehensive documented inspection program, should be conducted by trained personnel in compliance with the schedule in ANSI B30.10.
- For hooks used in frequent load cycles or pulsating loads, the hook and threads should be periodically inspected by Magnetic Particle or Dye Penetrant. (Note: Some disassembly may be required.)
- Never use a hook whose throat opening has been increased, or whose tip has been bent more than 10 degrees out of plane from the hook body, or is in any other way distorted or bent. **Note: A latch will not work properly on a hook with a bent or worn tip.**
- Never use a hook that is worn beyond the limits shown in Figure 1.
- Remove from service any hook with a crack, nick, or gouge. Hooks with a crack, nick or gouge shall be repaired by grinding lengthwise, following the contour of the hook, provided that the reduced dimension is within the limits shown in Figure 1.
- Never repair, alter, rework, or reshape a hook by welding, heating, burning, or bending.
- Never side load, back load, or tip load a hook. (See Figure 2)
- Eye hooks, shank hooks and swivel hooks are designed to be used with wire rope or chain. Efficiency of assembly may be reduced when used with synthetic material.
- Do not swivel the S-322 swivel hook while it is supporting a load.
- The use of a latch may be mandatory by regulations or safety codes; e.g., OSHA, MSHA, ANSI/ASME B30, Insurance, etc.
- Always make sure the hook supports the load. (See Figure 3) The latch must never support the load. (See Figure 4)
- When placing two (2) sling legs in hook, make sure the angle from the vertical to the outermost leg is not greater than 45 degrees, and the included angle between the legs does not exceed 90 degrees.* (See Figure 5)
- See ANSI/ASME B30.10 "Hooks" for additional information.

*For two legged slings with angles greater than 90°, use an intermediate link such as a master link or bolt type shackle to collect the legs of the slings. The intermediate link can then be placed over the hook to provide an in-line load on the hook. This approach must also be used when using slings with three or more legs.

⚠ WARNING

- **Loads may disengage from hook if proper procedures are not followed.**
- **A failing load may cause serious injury or death.**
- **See OSHA Rule 1926.550(g) for personnel hoisting by cranes or derricks. A 319, 320 or 322 hook with a PL Latch attached (when secured with the bolt, nut and pin) may be used for lifting personnel.**
- **Threads may corrode and/or strip and drop the load.**
- **Hook must always support the load. The load must never be supported by the latch.**
- **Never apply more force than the hook's assigned Working Load Limit (WLL) rating.**
- **Read and understand these instructions before using hook.**



ZONE A: REPAIR NOT REQUIRED
ZONE B: 10% OF ORIGINAL DIMENSION
ZONE C: 5% OF ORIGINAL DIMENSION
ZONE D: SEE MINIMUM THREAD SIZE

Figure 1

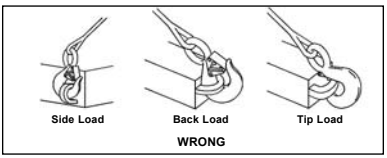


Figure 2

Figure 3

Figure 4

Figure 5

SHANK HOOKS

S-319

SEE APPLICATION AND WARNING INFORMATION

- The most complete line of shank hoist hooks. Available 3/4 to 300 tons.
- Available in carbon steel, alloy steel, and bronze.
- Quenched and Tempered.
- Proper design, careful forging and precision controlled quench and tempering give maximum strength without excessive weight and bulk.
- Every Crosby Shank Hook has a pre-drilled cam which can be equipped with a latch. Even years after purchase of the original hook, latch assemblies can be added.
- Load Rating code stamped on each hook (Refer to Hook Identification Code columns below).

S-319N

WORKING LOAD LIMIT* (TONS)				HOOK IDENTIFICATION CODE			DIMENSIONS (IN.)						
CARBON	ALLOY	BRONZE	SHANK‡ LENGTH TYPE	319-C 320-C 322-C	319-A 320-A 322-A	319-B	A	B	C	D	F	G	H
3/4*	1	.5	Std.	DC	DA	DB	4.42	1.47	3.34	2.86	1.25	.73	.81
1**	1-1/2	.6	Std.	FC	FA	FB	5.05	1.75	3.80	3.15	1.38	.84	.94
1-1/2**	2	1.0	Std.	GC	GA	GB	5.74	2.13	4.24	3.55	1.50	1.00	1.16
2**	3	1.4	Std.	HC	HA	HB	6.53	2.41	4.82	3.97	1.63	1.13	1.32
3**	4-1/2	2.0	Std.	IC	IA	IB	8.07	3.00	5.91	4.87	2.00	1.44	1.63
5**	7	3.5	Std.	JC	JA	JB	10.19	3.81	7.47	6.27	2.50	1.81	2.06
7-1/2**	11	5.0	Std.	KC	KA	KB	12.52	4.66	9.16	7.50	3.00	2.25	2.63
10**	15	6.5	Std.	LC	LA	LB	14.05	5.38	10.19	8.37	3.25	2.59	2.94
15**	22	10.0	Std.	NC	NA	NB	17.38	6.63	12.82	10.34	4.25	3.00	3.50
20	30	–	Std.	OC	OA	–	19.47	7.00	14.06	13.62	5.00	3.62	4.62
20	30	–	Long	OC	OA	–	–	–	–	13.62	5.00	3.62	4.62
25	37	–	Std.	PC	PA	–	24.81	8.50	18.19	14.06	5.38	4.56	5.00
25	37	–	Long	PC	PA	–	–	–	–	14.06	5.38	4.56	5.00
30	45	–	Std.	SC	SA	–	27.44	9.31	20.12	15.44	6.00	5.06	5.50
30	45	–	Long	SC	SA	–	–	–	–	15.44	6.00	5.06	5.50
40	60	–	Std	TC	TA	–	32.31	10.75	23.72	18.50	7.00	6.00	6.50
40	60	–	Long	TC	TA	–	–	–	–	18.50	7.00	6.00	6.50
50†	75†	–	Std.	UC	UA	–	–	–	–	20.62	7.75	6.69	7.25
50†	75†	–	Long	UC	UA	–	–	–	–	20.62	7.75	6.69	7.25
–	100†	–	Std.	–	WA	–	–	–	–	23.00	6.81	8.59	9.88
–	100†	–	Long	–	WA	–	–	–	–	23.00	6.81	8.59	9.88
–	150†	–	Std.	–	XA	–	–	–	–	24.38	6.75	9.12	10.94
–	200†	–	Std.	–	YA	–	–	–	–	26.69	7.50	9.75	11.81
–	300†	–	Std.	–	ZA	–	–	–	–	30.12	9.50	10.62	12.94

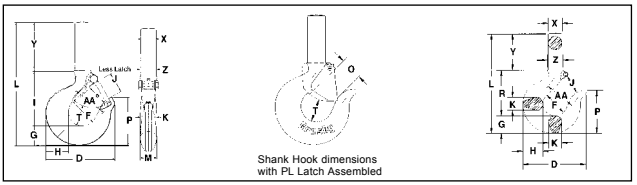
**Available hot dip galvanized. ‡See column "Y" for actual shank length.

†Cams on these hook sizes fit PL Latch only.

Hook I.D. Codes: A - Alloy Steel, B - Bronze, C - Carbon Steel.

*NOTE: Proof load is 2 times Working Load Limit. All carbon hooks – average straightening load (ultimate load) is 5 times Working Load Limit. Alloy eye hooks 1 ton thru 22 tons – average straightening load (ultimate load) is 5 times Working Load Limit. Alloy eye hooks 30 tons through 60 tons – average straightening load (ultimate load) is 4.0 times the Working Load Limit. Alloy shank hooks 1 ton through 22 tons – average straightening load (ultimate load) is 4.0 times the Working Load Limit. Alloy shank hooks 30 tons through 300 tons (ultimate load is All Bronze hooks – average straightening load (ultimate load) is 4 times Working Load Limit.

- Hoist hooks incorporate markings forged into the product which address two (2) QUIC-CHECK® features.
  - Deformation Indicators – Two strategically placed marks, one just below the shank or eye and the other on the hook up, which allow for a QUIC-CHECK® measurement to determine if the throat opening has changed, thus indicating abuse or overload.
  - To check, use a measuring device (i.e. tape measure) to measure the distance between the marks. The marks should align to either an inch or half-inch increment on the measuring device. If the measurement does not meet this criteria, the hook should be inspected further for possible damage.
  - Angle Indicators – Indicates the maximum included angle which is allowed between two (2) sling legs in the hook. These indicators also provide the opportunity to approximate other included angles between two sling legs.



QUIC-CHECK™

DIMENSIONS (IN.)											WEIGHT EACH (LBS.)		
J	K	L	O	P	Q	R	T††	X††	Y	Z	DEFORMATION INDICATOR AA	319	320
.93	.63†	5.14	.89	2.00	.75	2.35	.87	.59	2.06	.69	1.50	.50	.61
.97	.71†	5.68	.91	2.24	.91	2.59	.98	.66	2.25	.78	2.00	.75	.75
1.06	.88†	6.35	1.00	2.45	1.13	2.76	1.03	.72	2.59	.88	2.00	1.00	1.00
1.19	.94†	4.14	1.09	2.82	1.25	3.16	1.16	.88	2.84	1.00	2.00	1.82	1.85
1.50	1.31	8.63	1.36	3.51	1.56	3.85	1.53	1.16	3.34	1.25	2.50	3.69	3.85
1.78	1.66	10.43	1.61	4.52	2.00	4.77	1.96	1.41	3.84	1.56	3.00	7.25	7.25
2.41	1.88	12.52	2.08	5.32	2.44	5.88	2.47	1.81	4.38	1.94	4.00	13.49	13.00
2.62	2.19	13.47	2.27	6.00	2.84	6.37	2.62	2.00	4.50	2.19	4.00	18.00	17.25
3.41	2.69	16.65	3.02	6.90	3.50	8.14	2.83	2.56	5.50	2.63	5.00	35.33	33.00
4.00	3.00	23.09	3.25	8.78	3.50	9.44	3.44	3.12	10.00	3.12	6.50	72.00	53.00
4.00	3.00	31.09	3.25	8.78	–	9.44	3.44	3.12	18.00	3.12	6.50	85.50	85.50
4.25	3.62	31.12	3.00	11.38	4.50	12.56	3.88	4.00	15.00	4.00	7.00	134.00	134.00
4.25	4.00	41.12	3.00	11.38	–	12.56	3.88	4.00	24.00	4.00	7.00	172.00	172.00
4.75	3.72	34.12	3.38	12.63	4.94	14.00	4.75	4.00	15.00	4.00	8.00	182.00	182.00
4.75	4.50	43.12	3.38	12.63	–	14.00	4.75	4.00	24.00	4.00	8.00	214.00	214.00
5.75	4.44	36.06	4.12	14.81	5.69	15.50	5.69	4.50	14.50	4.50	10.00	268.00	268.00
5.75	5.50	47.56	4.12	14.81	–	15.50	5.69	4.50	26.00	4.50	10.00	312.00	312.00
6.50	6.25	41.16	5.38	16.53	–	19.38	6.00	5.00	15.00	5.00	11.50	390.00	390.00
6.50	6.25	49.16	5.38	16.53	–	19.38	6.00	5.00	15.00	5.00	11.50	390.00	390.00
5.88	5.50	42.12	4.50	17.38	–	18.41	7.00	7.00	15.00	7.00	12.00	610.00	610.00
5.88	5.50	48.12	4.50	17.38	–	18.41	7.00	7.00	21.00	7.00	12.00	675.00	675.00
6.00	6.00	45.75	4.50	18.00	–	18.38	7.00	7.25	18.00	7.25	13.00	735.00	735.00
6.60	7.00	50.50	5.00	19.25	–	20.50	8.00	8.00	20.00	8.00	13.00	1020.00	1020.00
8.00	7.25	54.69	6.25	22.69	–	23.50	8.25	9.50	20.00	9.50	15.00	1390.00	1390.00

†Dimensions shown are for S-4320 latch kits. Dimensions for sizes 20 ton carbon and larger are for PL Latch Kits.
††Dimension before machining (as forged).

*NOTE: Proof load is 2 times Working Load Limit. All carbon hooks – average straightening load (ultimate load) is 5 times Working Load Limit. Alloy eye hooks 1 ton thru 22 tons – average straightening load (ultimate load) is 5 times Working Load Limit. Alloy eye hooks 30 tons through 60 tons – average straightening load (ultimate load) is 4.0 times the Working Load Limit. Alloy shank hooks 1 ton through 22 tons – average straightening load (ultimate load) is 4.0 times the Wroking Load Limit. Alloy shank hooks 30 tons through 300 tons (ultimate load is All Bronze hooks – average straightening load (ultimate load) is 4 times Working Load Limit.

EYE HOOKS

S-320

SEE APPLICATION AND WARNING INFORMATION

All Crosby 320 Eye Hoist Hooks incorporate the following features:

- Designed with 5:1 Design Factor.
- Proper design, careful forging and precision controlled quenched and tempering give maximum strength without excessive weight and bulk.
- Pre-drilled cam which can be equipped with a latch.
- Eye hooks are load rated.
- Available in carbon steel and alloy steel.
- Strategically placed markings forged into the product which address two (2) QUIC-CHECK® features. (See following page)
- Fatigue rated at 1-1/2 times the Working Load Limit at 20,000 cycles.
- Low profile hook tip.
- Integrated latch (S-4320) meets the World class standard for lifting.
  - Heavy duty stamped latch interlocks with the hook tip.
  - High cycle, long life spring.
  - When secured with proper cotter pin through the hole in the tip of the hook, meets the intent of OSHA Rule 1926.550(g) for personnel hoisting.

S-320N / S-1320N

QT QUENCHED & TEMPERED

Load Rated

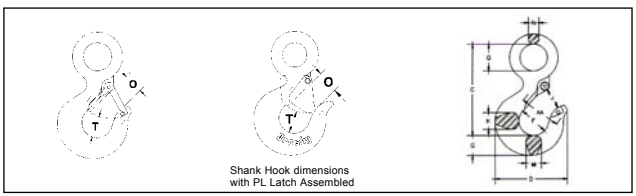
WORKING LOAD LIMITS* (TONS)		HOOK ID CODE	EYE HOOK STOCK NO.			WEIGHT EACH (LBS.)	REPLACEMENT LATCH KITS		
CARBON	ALLOY		CARBON S-320C S.C.	CARBON G-320C GALV.	ALLOY S320A S.C.		S-4320 STOCK NO.	PL STOCK NO.	SS-4055 STOCK NO.
3/4†	1†	D	1022200	1022208	1022375	.61	1096325	–	–
1†	1-1/2†	F	1022211	1022219	1022386	.89	1096374	–	–
1-1/2†	2†	G	1022222	1022230	1022397	1.44	1096421	–	–
2†	3†	H	1022233	1022241	1022406	2.07	1096468	–	–
3†	5†	I	1022244	1022249	1022419	4.30	1096515	–	–
5†	7†	J	1022255	1022262	1022430	8.30	1096562	–	–
7-1/2†	11†	K	1022264	1022274	1022441	15.00	1096609	–	–
10†	15†	L	1022277	1022285	1022452	21.60	1096657	–	–
15†	22†	N	1022288	1022296	1022465	39.50	1096704	–	–
20	30	O	1023289	–	1023546	60.00	–	1093716	1090161
25	37	P	1023305	–	1023564	105.00	–	1093717	1090189
30	45	S	1023323	–	1023582	148.00	–	1093718	1090189
40	60	T	1023341	–	1023608	228.00	–	1093719	1090205

*Eye Hooks (3/4TC - 22TA), Proof load is 2.5 times Working Load Limit. Eye Hooks (20TC - 60TA), Proof Load is 2 times Working Load Limit. All carbon hooks – average straightening loads (ultimate load) is 5 tiimes Working Load Limit. Alloy eye hooks 1 ton through 22 ton – average load) is 4.5 times Working Load Limit.
†New 320N style hook.

SEE APPLICATION AND WARNING INFORMATION

QUIC-CHECK™

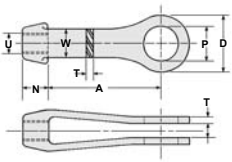
- Hoist hooks incorporate markings forged into the product which address two (2) QUIC-CHECK® features.
  - Deformation Indicators – Two strategically placed marks, one just below the shank or eye and the other on the hook up, which allow for a QUIC-CHECK® measurement to determine if the throat opening has changed, thus indicating abuse or overload.
  - To check, use a measuring device (i.e. tape measure) to measure the distance between the marks. The marks should align to either an inch or half-inch increment on the measuring device. If the measurement does not meet this criteria, the hook should be inspected further for possible damage.
  - Angle Indicators – Indicates the maximum included angle which is allowed between two (2) sling legs in the hook. These indicators also provide the opportunity to approimate other included angles between two sling legs.



Shank Hook dimensions with PL Latch Assembled

HOOK ID	DIMENSIONS (IN.)											
CODE	C	D	F	G	J	K	M	N	O	Q	T	AA
D	3.34	2.83	1.25	.73	.91	.63	.63	.36	.89	.75	.87	1.50
F	3.81	3.11	1.38	.84	.93	.71	.71	.42	.91	.91	.98	2.00
G	4.14	.353	1.50	1.00	1.00	.88	.88	.55	1.00	1.13	1.03	3.00
H	4.69	3.97	1.63	1.13	1.13	.94	.94	.58	1.09	1.25	1.16	2.00
I	5.77	4.81	2.00	1.44	1.47	1.31	1.31	.72	1.36	1.56	1.53	2.50
J	7.37	6.27	2.50	1.81	1.75	1.66	1.66	.90	1.61	2.00	1.96	3.00
K	9.07	7.45	3.00	2.25	2.29	1.88	1.63	1.11	2.08	2.44	2.47	4.00
L	10.08	8.30	3.25	2.59	2.50	2.19	1.94	4.27	2.27	2.84	2.62	4.00
N	12.53	10.30	4.25	3.00	3.30	2.69	2.38	1.56	3.02	3.50	2.83	5.00
O	14.06	13.62	5.00	3.62	4.00	3.00	3.00	1.75	3.25	3.50	3.44	6.50
P	18.19	14.06	5.38	4.56	4.25	4.00	3.19	2.00	3.00	4.50	3.88	7.00
S	20.12	15.44	6.00	5.06	4.75	4.50	3.25	2.18	3.38	4.94	4.75	8.00
T	23.72	18.50	7.00	6.00	5.75	5.50	3.91	2.53	4.12	5.69	5.69	10.00

*Eye Hooks (3/4TC - 22TA), Proof load is 2.5 times Working Load Limit. Eye Hooks (20TC - 60TA), Proof Load is 2 times Working Load Limit. All carbon hooks – average straightening loads (ultimate load) is 5 tiimes Working Load Limit. Alloy eye hooks 1 ton through 22 ton – average load) is 4.5 times Working Load Limit.



Material: C-1035 and SA-182-F-11 in stock
Threads: U.N.C. Class 2B, Right or Left Hand
Finish: Self-Colored, Galvanized, Plated
Options: Stainless Steel; Other Alloys; Special Threading

Maximum working loads have been established with a safety factor of 5:1 using the maximum pin diameter, the resulting net area of the eye at the pin hole, and the expected ultimate tensile strength of C-1035 steel.

The maximum tap size (U dimension) shown in Table I is for reference purposes only. It should be used **only** to determine the largest tap diameter the clevis can accommodate without considering the pin diameter. Use Table II to select the proper combination of tap size and pin diameter for any given size of clevis.

Clevis sizes in Table II for any given tap size and pin diameter combination are based upon the net area of the eye at the pin hole being equal to or greater than 125% of the net area at the minor diameter of a round rod without upset ends, threaded Unified National Coarse Series.

For any combination of tap size and pin diameter shown, the pin in double shear will develop the strength of the rod if both the rod and pin are made from steel having the same physical properties. The pin must be investigated for bending, however; and if inadequate, a larger diameter pin selected. Pins supplied with clevises by Cleveland City Forge are made from steel having a minimum ultimate tensile strength of 58,000 pounds per square inch, unless otherwise specified.

If the pin is made from steel with physical properties lower in value than the steel used for the rod, the pin may not develop the strength of the rod in either shear or bending; requiring a larger diameter pin.

Some combinations of tap size and pin diameter shown will not develop the maximum working load of the clevis shown in Table I.

Selection of the rod and pin, the material from which both are made, as well as the clevis size adequate to meet the required design load is the responsibility of the purchaser or user. Load imposed upon the clevis should not exceed the maximum working load values shown in Table I.

TABLE I
STANDARD CLEVIS DIMENSIONS – Inches

CLEVIS NO.	D	N	U MAX.	W	TOLERANCE	A	P MAX.	MAX. WORKING LOAD KIPS	WGT. EACH LBS.
2	1-7/16	5/8	5/8	1-1/16	5/16 + 1/32 - 0	3-9/16	3/4	3.5	1
2-1/2	2-1/2	1-1/8	7/8	1-1/4	5/16 + 1/32 - 0	4	1-1/2	7.5	2-1/2
3	3	1-1/4	1-3/8	1-1/2	1/2 + 1/32 - 1/32	5-1/16	1-3/7	15	4
3-1/2	3-1/2	1-1/2	1-1/2	1-3/4	1/2 + 1/16 - 1/16	6	2	18	6
4	4	1-3/4	1-3/4	2	1/2 + 1/16 - 1/16	5-15/16	2-1/4	21	8
5	5	2-1/4	2-1/8	2-1/2	5/8 + 3/32 - 0	7	2-1/2	37.5	16
6	6	2-3/4	2-1/2	3	3/4 + 3/32 - 0	8	3	54	26
7	7	3	3	3-1/2	7/8 + 1/8 - 1/16	9	3-3/4	68.5	36
8	8	4	4	4	1-1/2 + 1/8 - 1/16	10-1/8	4-1/4	135	90

TABLE II
DIAMETER OF PIN – Inches

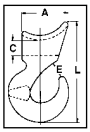
DIAMETER OF TAP – Inches	1/2	5/8	3/4	7/8	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	3¾	4	4¼
3/8	2	2	2															
1/2	2	2	2															
5/8	2	2	2	2½	2½	2½	2½											
3/4			2½	2½	2½	2½	2½											
7/8				2½	2½	2½	3											
1					3	3	3	3										
1-1/8					3	3	3	3	3½									
1-1/4					3	3	3	3	3½									
1-3/8						3	3	3½	3½	4								
1-1/2						3½	3½	4	4	5								
1-5/8						4	4	4	5	5	5							
1-3/4							4	5	5	5	5							
1-7/8							5	5	5	5	5							
2							5	5	5	5	5	6	6					
2-1/8								5	5	6	6	6	6					
2-1/4									6	6	6	6	6	7	7			
2-3/8									6	6	6	6	7	7	7	7		
2-1/2									6	6	6	7	7	7	7	7		
2-5/8											7	7	7	7	7	8		
2-3/4											7	7	7	7	8	8		
2-7/8											7	8	8	8	8	8	8	8
3											7	8	8	8	8	8	8	8
3-1/8												8	8	8	8	8	8	8
3-1/4												8	8	8	8	8	8	8
3-3/8												8	8	8	8	8	8	8
3-1/2													8	8	8	8	8	8
3-5/8													8	8	8	8	8	
3-3/4														8	8	8	8	
3-7/8															8	8	8	
4															8	8		

HOOKS • SNAP • REPLACEMENT • SORTING

- FORGED ALLOY STEEL through 3/4".
- Wide throat to take heavy thimbles

*Ultimate Load is 5 times Safe Working Load.

†When ordering, EYE diameter ("C") should be specified.



A-350

SLIDING CHOKER HOOK with LATCH

SLIDING CHOKER HOOKS Quenched & Tempered

SINGLE PART ROPE SIZE	EIGHT PART ROPE SIZE	SAFE WORKING LOAD* (LBS.)	DIMENSIONS (IN.)				WEIGHT EACH (LBS.)
			A	C	E	L	
3/8	–	2,500	2-1/16	5/8	5/8	4-9/32	.77
1/2	1/8	3,300	2-1/4	3/4	25/32	4-31/32	1.19
5/8†	3/16	5,000	3-1/16	3/4 OR 1	5/16	6-3/8	2.89
3/4†	1/4	8,000	3-3/8	1 OR 1-7/16	1-5/32	7-21/32	5.00

G-3315

- Pressed steel latches and stainless steel springs, bolts and nuts.
- Safe Working Loads shown are based on Ultimate Load that is 4 times the Safe Working Load.

SNAP HOOKS Forged Steel, Quenched & Tempered

HOOK SIZE (IN.)	SAFE WORKING LOAD (LBS.)	INSIDE DIAM. OF EYE (IN.)	THROAT OPENING (IN.)	LENGTH OVERALL (IN.)	WEIGHT POUNDS PER 100
7/16	750	3/4	3/4	3-15/16	23.25
9/16	1,000	1-1/8	13/16	4-3/4	48.25

S-3316

- Easily attached to any hoist with welded link load chain and roller chain or wire rope with suitable end fitting.
- Spring latch, latch bolt with self locking nut – stainless steel. Nuts cadmium plated brass.
- For chain and electric hoists with swivel jaw-forged.

REPLACEMENT HOOKS Quenched & Tempered

SIZE HOIST (TON)	WIDTH BETWEEN JAWS (IN.)	DIAM. BOLT (IN.)	OVERALL LENGTH (IN.)	THROAT OPENING (IN.)	WEIGHT EACH (LBS.)
1/2	9/16	3/8	6-1/8	31/32	1.25
1	11/16	7/16	7-11/16	1-1/8	2.61

A-378

- Deep straight throat permits efficient handling of flat plates or large cylindrical shapes.
- The long tapered point allow easy grab in rings, pear links, eye bolts or lifting holes.
- Ultimate load is 5 times the Safe Working Load.

SORTING HOOK with HANDLE

SORTING HOOKS Forged Alloy Steel Quenched & Tempered

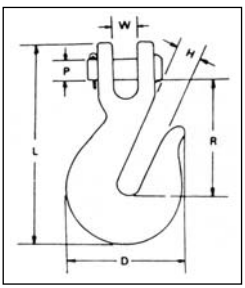
Safe Working Load at Tip	2 Ton
Safe Working Load at Bottom of Hook	7-1/2 Ton
Overall Length	9-11/16"
I.D. of Eye	1-3/8"
Opening at Top of Hook	2-13/16"
Radius at Bottom of Hook	5/8"
Weight Each	6.42 Lbs.

CM ALLOY CLEVIS TYPE GRAB HOOK – GRADE 80

SEE APPLICATION AND WARNING INFORMATION

M806A

- Attach directly to the chain – no connecting links to buy.
- Heat treated pins.
- Extra deep throat.
- Painted orange.
- Hooks embossed with chain grade.
- "Alloy" forged on every hook.
- Grab hooks are compatible with grade 80 alloy chain except M807A.
- Alloy clevis hooks develop the mechanical properties of grade 80, as stated, but are not recommended for overhead lifting sling applications.

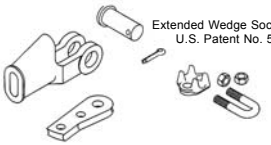


CHAIN SIZE (IN.)	WORKING LOAD LIMIT† (LBS.)	PROD. CODE	DIMENSIONS (IN.)						APPROX WEIGHT EA. (LBS.)
			W	D	H	L	P	R	
1/4	3,500	M804A	5/16	1-15/16	3/8	3-1/4	21/64	1-7/8	.38
5/16	4,500	M805A	3/8	2-9/32	7/16	3-31/32	25/64	2-3/8	.62
3/8	7,100	M806A	29/64	2-5/8	1/2	4-1/2	1/2	2-5/8	.96
7/16	6,900	M807A**	1/2	3	9/16	5-1/32	1/2	3	1.46
1/2	12,000	M808A	19/32	3-7/16	21-32	5-23/32	19/32	3-5/16	2.02
5/8	18,100	M810A	3/4	4-5/16	23-32	6-7/8	3/4	3-15/16	3.75

†Alloy clevis hooks develop the mechanical properties of grade 80, as stated, but are not recommended for overhead lifting sling applications.
**Grade 63

WEDGE SOCKET

WARNINGS AND APPLICATION INSTRUCTIONS



Extended Wedge Socket Assembly
U.S. Patent No. 5,553,360

S-421T
"THE TERMINATOR™"

NOTE: Existing Crosby S-421 Wedge Sockets can be retrofitted with the New Terminator Wedge.

New QUIC-CHECK™ "Go" and "No-Go" features cast into wedge. The proper size wire rope is determined when the following criteria are met:
1. The wire rope shall pass thru the "Go" hole in the wedge.
2. The wire rope shall NOT pass thru the "No-Go" hole in the wedge.

Important Safety Information – Read and Follow

Inspection / Maintenance Safety

- Always inspect socket, wedge and pin before using.
- Do not use part showing cracks.
- Do not use modified or substitute parts.
- Repair minor nicks or gouges to socket or pin by lightly grinding until surfaces are smooth. Do not reduce original dimension more than 10%. Do not repair by welding.
- Inspect permanent assemblies annually, or more often in severe operating conditions.

Assembly Safety

- Use only with standard 6 to 8 strand wire rope of designated size. For intermediate size rope, use next larger size socket. For example: When using 9/16" diameter wire rope use a 5/8" size Wedge Socket Assembly. WElding of the tail on the standard wire rope is not recommended. The tail length of the dead end should be a minimum of 6 rope diameters but not less than 6". (See Figure 1)
- To use with Rotation Resistant wire rope (special wire rope constructions with 8 or more outer strands) ensure that the dead end is welded, brazed or seized before inserting the wire rope into the wedge socket to prevent core slippage or loss of rope lay. The tail length of the dead end should be a minimum of 20 rope diameters but not less than 6". (See Figure 1)
- Properly match socket, wedge and clip (See Table I) to wire rope size.
- Align live end of rope, with center line of pin. (See Figure 1)
- Secure dead end section of rope. (See Figure 1)
- Tighten nuts on clip to recommended torque. (Table I)
- Do not attach dead end to live end or install wedge backwards. (See Figure 2)
- **Use a hammer to seat Wedge and Rope as deep into socket as possible before applying first load.**

⚠ WARNING

- **Loads may slip and fall if the Wedge Socket is not properly installed.**
- **A failing load can seriously injure or kill.**
- **Read and understand these instructions before installing the Wedge Socket.**
- **Do not side load the Wedge Socket.**
- **Apply first load to fully seat the Wedge and Wire Rope in the socket. This load should be of equal or greater weight than loads expected in use.**

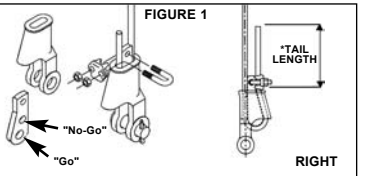


FIGURE 1

*Tail Length	
Standard 6 to 8 strand wire rope	**Rotation Resistant Wire Rope**
A minimum of 6 rope diameters, but not less than 6".	A minimum of 20 rope diameters, but not less than 6".

TABLE I

Rope Size	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1-1/8	1-1/4
Clip Size	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1-1/8	1-1/4
*Torque Ft./Lbs.	45	65	65	95	95	130	225	225	225	360

*The lightening torque values shown are based upon the threads being clean, dry, and free of lubrication.

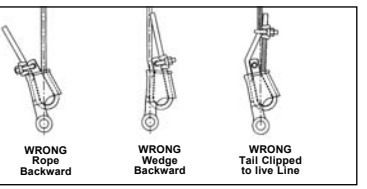


FIGURE 2

Operating Safety

- Apply first load to fully seat the Wedge and Wire Rope in the socket. This load should be of equal or greater weight than loads expected in use.
- Efficiency rating of the Wedge socket termination is based upon the catalog breaking strength of Wire Rope. The efficiency of a properly assembled Wedge Socket is 80%.
- During use, do not strike the dead end section with any other elements of the rigging (Called two-blocking).

"THE TERMINATOR™"

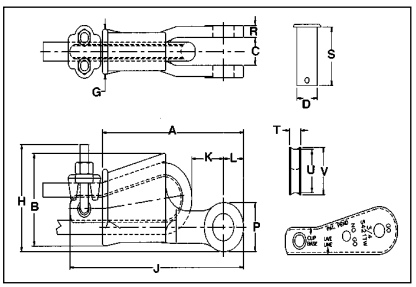
Crosby's *New & Improved* Wedge Socket

SEE APPLICATION AND WARNING INFORMATION

QUIC-CHECK™

U.S. Patent No. 5,553,360 and foreign equivalents

S-421T



- Basket is cast steel.
- Individually magnetic particle inspected.
- Pin diameter and jaw opening allows wedge and socket to be used in conjunction with open swage and spelter sockets.
- Secures the tail or "dead end" of the wire rope to the wedge, thus eliminates loss or "Punch out" of the wedge.
- The *TERMINATOR*™ wedge eliminates the potential breaking off of the tail due to fatigue.
- The tail, which is secured by the base of the clip and the wedge, is left undeformed and available for reuse.
- Incorporates Crosby's patented QUIC-CHECK™ "Go" and "No-Go" feature cast into the wedge. The proper size rope is determined when the following criteria are met:
  1. The wire rope should pass thru the "Go" hole in the wedge.
  2. The wire rope should NOT pass thru the "No-Go" hole in the wedge.
- Utilizes standard Crosby Red-U-Bolt wire rope clip.
- Generates a minimum efficiency of 80% based on the catalog breaking strength of the wire rope.
- Standard S-421 wedge socket can be retrofitted with the new style *TERMINATOR*™ wedge.
- Available with Bolt, Nut and Cotter Pin.

WIRE ROPE SIZE (IN.)	S-421T STOCK NO COMPLETE ASSEMBLY*	S-421T WEIGHT EACH (LBS.)	S-421TW STOCK NO. WEDGE ONLY	S-421TW WEIGHT EACH (LBS.)
3/8	1035000	3.18	1035555	.50
1/2	1035009	6.15	1035564	1.05
5/8	1035018	9.70	1035573	1.79
3/4	1035027	14.50	1035582	2.60
7/8	1035036	21.50	1035591	4.02
1	1035045	30.75	1035600	5.37
1-1/8	1035051	45.30	1035609	7.84
1-1/4**	1040448	57.50	1040607	6.81

*Terminator Assembly includes Socket, Wedge, Pin and Wire Rope Clip.
**1-1/4" not available in *TERMINATOR*™ style.

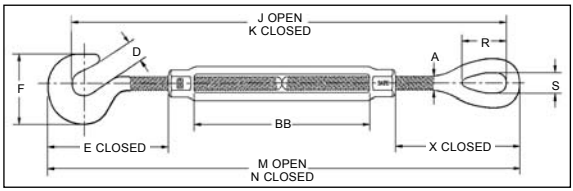
WIRE ROPE DIA.‡ (IN.)	DIMENSIONS (IN)														
	A	B	C	D	G	H	J†	K†	L	P	R	S	T	U	V
3/8	5.63	2.66	.81	.81	1.38	3.12	7.38	1.60	.88	1.56	.44	2.13	.44	1.25	1.38
1/2	6.81	3.53	1.00	1.00	1.62	3.85	8.75	1.21	1.06	1.94	.50	2.56	.53	1.75	1.88
5/8	8.16	4.25	1.25	1.19	2.12	4.58	10.34	1.64	1.22	2.25	.56	3.25	.69	2.00	2.19
3/4	9.78	4.96	1.50	1.38	2.44	5.37	12.03	2.17	1.40	2.62	.66	3.63	.78	2.34	2.56
7/8	11.16	5.66	1.75	1.63	2.69	6.28	14.00	2.22	1.66	3.12	.75	4.31	.88	2.69	2.94
1	12.75	6.31	2.00	2.00	2.56	7.02	15.86	2.71	2.00	3.75	.88	4.70	1.03	2.88	3.29
1-1/8	14.38	6.94	2.25	2.25	3.31	7.76	17.70	2.50	2.25	4.25	1.00	5.44	1.19	3.13	3.56
1-1/4	16.00	7.53	2.50	2.50	3.56	N/A	N/A	3.39	2.50	4.75	1.12	6.13	1.31	3.38	3.81

†Nominal
‡For intermediate wire rope sizes use next larger size socket.

Hook & Eye Turnbuckles

HG-225
HOOK & EYE

Meets the performance requirements of Federal Specification FF-T-79 lb., Type 1, Form 1 – CLASS 6, and ASTM F-1145, except for those provisions required of the contractor.



- Hot Dip galvanized steel.
- End fittings are Quenched and Tempered, bodies heat treated by normalizing.
- Turnbuckle eyes are forged elongated, by design, to maximize easy attachment in system and minimize stress in the eye. For turnbuckle sizes 1/4" through 2-1/2", a shackle one size smaller can be reeved through eye.
- Turnbuckle hooks are forged with a greater cross sectional area that results in a stronger hook with better fatigue properties.
- TURNBUCKLES RECOMMENDED FOR STRAIGHT OR IN-LINE PULL ONLY.
- Modified UNJ thread on end fittings for improved fatigue properties. Body has UNC threads.
- Lock Nuts available for all sizes.

Fatigue Rated

THREAD DIAMETER & TAKE UP (IN.)	STOCK NO. GALV.	WORKING LOAD LIMIT* (LBS.)	WEIGHT EACH (LBS.)	DIMENSIONS (IN)											
				A	D	E CLOSED	F	J OPEN	K CLOSED	M OPEN	N CLOSED	R	S	X CLOSED	BB
1/4 x 4	1030636	400	.29	.25	.45	1.59	1.27	11.46	7.46	12.09	8.09	.78	.34	1.75	4.00
5/16 x 4-1/2	1030654	700	.49	.31	.50	1.94	1.50	13.19	8.69	13.47	9.47	.94	.44	2.09	4.50
3/8 x 6	1030672	1000	.78	.38	.56	2.30	1.77	16.98	10.98	17.94	11.94	1.12	.53	2.52	6.00
1/2 x 6	1030690	1500	1.61	.50	.66	2.94	2.28	19.45	12.45	20.67	13.67	1.42	.72	3.23	6.00
1/2 x 9	1030716	1500	1.85	.50	.66	2.94	2.28	25.45	15.45	26.67	16.67	1.42	.72	3.23	9.00
1/2 x 12	1030734	1500	2.26	.50	.66	2.94	2.28	31.45	18.45	32.67	19.67	1.42	.72	3.23	12.00
5/8 x 6	1030752	2250	2.70	.63	.90	3.69	2.81	21.96	13.96	22.72	15.47	1.80	.88	3.90	6.00
5/8 x 9	1030770	2250	3.13	.63	.90	3.69	2.81	27.96	16.96	28.72	18.47	1.80	.88	3.90	9.00
5/8 x 12	1030798	2250	3.78	.63	.90	3.69	2.81	33.21	19.96	34.72	21.47	1.80	.88	3.90	12.00
3/4 x 6	1030814	3000	3.89	.75	.98	4.52	3.33	23.13	15.63	24.95	17.45	2.09	1.00	4.69	6.00
3/4 x 9	1030832	3000	4.61	.75	.98	4.52	3.33	29.13	18.63	30.95	20.45	2.09	1.00	4.69	9.00
3/4 x 12	1030850	3000	5.83	.75	.98	4.52	3.33	35.13	21.63	36.95	23.45	2.09	1.00	4.69	12.00
3/4 x 18	1030878	3000	6.33	.75	.98	4.52	3.33	47.13	27.63	48.95	29.45	2.09	1.00	4.69	18.00
7/8 x 12	1030896	4000	8.10	.88	1.13	5.19	3.78	36.53	22.78	38.66	24.91	2.38	1.25	5.10	12.00
7/8 x 18	1030912	4000	9.95	.88	1.13	5.19	3.78	48.53	28.78	50.66	30.91	2.38	1.25	5.10	18.00
1 x 6	1030930	5000	9.33	1.00	1.25	5.84	4.25	26.80	18.80	29.20	21.20	3.00	1.44	6.36	6.00
1 x 12	1030958	5000	11.93	1.00	1.25	5.84	4.25	38.80	24.80	41.20	27.20	3.00	1.44	6.36	12.00
1 x 18	1030976	5000	14.00	1.00	1.25	5.84	4.25	50.80	30.80	53.20	33.20	3.00	1.44	6.36	18.00
1 x 24	1030994	5000	17.25	1.00	1.25	5.84	4.25	62.80	36.80	65.20	39.20	3.00	1.44	6.36	24.00
1-1/4 x 12	1031010	6500	19.00	1.25	1.50	7.22	5.13	41.63	27.13	44.56	30.06	3.56	1.81	7.72	12.00
1-1/4 x 18	1031038	6500	23.00	1.25	1.50	7.22	5.13	53.63	33.13	56.56	36.06	3.56	1.81	7.72	18.00
1-1/4 x 24	1031056	6500	24.00	1.25	1.50	7.22	5.13	65.63	39.13	68.56	42.06	3.56	1.81	7.72	24.00
1-1/2 x 12	1031074	7500	27.50	1.50	1.88	8.34	5.75	44.72	29.72	47.72	32.72	4.06	2.12	8.62	12.00
1-1/2 x 18	1031092	7500	31.00	1.50	1.88	8.34	5.75	56.72	35.72	59.72	38.72	4.06	2.12	8.62	18.00
1-1/2 x 24	1031118	7500	37.50	1.50	1.88	8.34	5.75	68.72	41.72	71.72	44.72	4.06	2.12	8.62	24.00

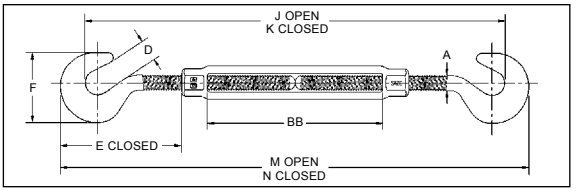
*Proof Load is 2.5 times the Working Load Limit. Ultimate Load is 5 times Working Load Limit.

Hook & Hook Turnbuckles

Hanes SUPPLY, INC.
YOUR SLING AND RIGGING SPECIALIST

HG-223
HOOK & HOOK

Meets the performance requirements of Federal Specification FF-T-79 lb., Type 1, Form 1 – CLASS 5, and ASTM F-1145, except for those provisions required of the contractor.



- Hot Dip galvanized steel.
- End fittings are Quenched and Tempered, bodies heat treated by normalizing.
- Turnbuckle hooks are forged with a greater cross sectional area that results in a stronger hook with better fatigue properties.
- TURNBUCKLES RECOMMENDED FOR STRAIGHT OR IN-LINE PULL ONLY.
- Modified UNJ thread on end fittings for improved fatigue properties. Body has UNC threads.
- Lock Nuts available for all sizes.
- Fatigue Rated.

Fatigue Rated

THREAD DIAMETER & TAKE UP (IN.)	STOCK NO. GALV.	WORKING LOAD LIMIT* (LBS.)	WEIGHT EACH (LBS.)	DIMENSIONS (IN)								
				A	D	E CLOSED	F	J OPEN	K CLOSED	M OPEN	N CLOSED	BB
1/4 x 4	1030011	400	.30	.25	.45	1.59	1.27	11.12	7.12	11.94	7.94	4.00
5/16 x 4-1/2	1030039	700	.47	.31	.50	1.94	1.50	12.81	8.31	13.81	9.31	4.50
3/8 x 6	1030057	1000	.78	.38	.56	2.30	1.77	16.50	10.50	17.72	11.72	6.00
1/2 x 6	1030075	1500	1.60	.50	.66	2.94	2.28	18.82	11.82	20.38	13.38	6.00
1/2 x 9	1030093	1500	1.83	.50	.66	2.94	2.28	24.82	14.82	26.38	16.38	9.00
1/2 x 12	1030119	1500	2.28	.50	.66	2.94	2.28	30.82	17.82	32.38	19.38	12.00
5/8 x 6	1030137	2250	2.75	.63	.90	3.69	2.81	20.50	13.25	22.50	15.25	6.00
5/8 x 9	1030155	2250	3.38	.63	.90	3.69	2.81	26.50	16.25	28.50	18.25	9.00
5/8 x 12	1030173	2250	3.50	.63	.90	3.69	2.81	32.50	19.25	34.50	21.25	12.00
3/4 x 6	1030191	3000	3.89	.75	.98	4.52	3.33	22.38	14.88	24.78	17.28	6.00
3/4 x 9	1030217	3000	5.28	.75	.98	4.52	3.33	28.38	17.88	30.78	20.28	9.00
3/4 x 12	1030235	3000	5.43	.75	.98	4.52	3.33	34.38	20.88	36.78	23.28	12.00
3/4 x 18	1030253	3000	8.12	.75	.98	4.52	3.33	46.38	26.88	48.78	29.28	18.00
7/8 x 12	1030271	4000	8.10	.88	1.13	5.19	3.78	36.00	22.25	38.75	25.00	12.00
7/8 x 18	1030299	4000	9.95	.88	1.13	5.19	3.78	48.00	28.25	50.75	31.00	18.00
1 x 6	1030315	5000	9.33	1.00	1.25	5.84	4.25	25.63	17.63	28.69	20.69	6.00
1 x 12	1030333	5000	11.93	1.00	1.25	5.74	4.25	37.63	23.63	40.69	26.69	12.00
1 x 18	1030351	5000	14.00	1.00	1.25	5.84	4.25	49.63	29.63	52.69	32.69	18.00
1 x 24	1030379	5000	17.25	1.00	1.25	5.84	4.25	61.63	35.63	64.69	38.69	24.00
1-1/4 x 12	1030397	6500	20.58	1.25	1.50	7.22	5.13	40.44	25.94	44.06	29.56	12.00
1-1/4 x 18	1030413	6500	23.00	1.25	1.50	7.22	5.13	52.44	31.94	56.06	35.56	18.00
1-1/4 x 24	1030431	6500	27.00	1.25	1.50	7.22	5.13	64.44	37.94	68.06	41.56	24.00
1-1/2 x 12	1030459	7500	27.50	1.50	1.88	8.34	5.75	43.94	28.94	47.44	32.44	12.00
1-1/2 x 18	1030477	7500	31.00	1.50	1.88	8.34	5.75	55.96	34.94	59.44	38.44	18.00
1-1/2 x 24	1030495	7500	37.50	1.50	1.88	8.34	5.75	67.94	40.94	71.44	44.44	24.00

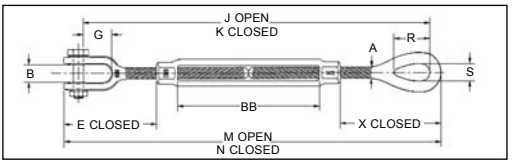
*Proof Load is 2.5 times the Working Load Limit. Ultimate Load is 5 times Working Load Limit.

Hanes SUPPLY, INC.
YOUR SLING AND RIGGING SPECIALIST

Jaw & Eye Turnbuckles

HG-227
JAW & EYE

Meets the performance requirements of Federal Specification FF-T-79 lb., Type 1, Form 1 – CLASS 8, and ASTM F-1145, except for those provisions required of the contractor.



- Hot Dip galvanized steel.
- End fittings are Quenched and Tempered, bodies heat treated by normalizing.
- Turnbuckle eyes are forged elongated, by design, to maximize easy attachment in system and minimize stress in the eye. For turnbuckle sizes 1/4" through 2-1/2", a shackle one size smaller can be reeved through eye.
- Forged jaw ends are fitted with bolts and nuts for 1/4" through 5/8", and pins and cotters on 3/4" through 2-3/4" sizes.
- TURNBUCKLES RECOMMENDED FOR STRAIGHT OR IN-LINE PULL ONLY.
- Modified UNJ thread on end fittings for improved fatigue properties. Body has UNC threads.
- Lock Nuts available for all sizes.

Fatigue Rated

THREAD DIAMETER & TAKE UP (IN.)	STOCK NO. GALV.	WORKING LOAD LIMIT* (LBS.)	WEIGHT EACH (LBS.)	DIMENSIONS (IN)											
				A	D	E CLOSED	F	J OPEN	K CLOSED	M OPEN	N CLOSED	R	S	X CLOSED	BB
1/4 x 4	1031877	500	.30	.25	.45	1.58	.62	11.35	7.35	12.07	8.17	.78	.34	1.75	4.00
5/16 x 4-1/2	1031895	800	.50	.31	.50	1.98	.87	13.71	8.71	14.01	9.51	.94	.44	2.09	4.50
3/8 x 6	1031911	1200	.80	.38	.54	2.12	.87	16.81	10.81	17.77	11.77	1.12	.53	2.52	6.00
1/2 x 6	1031939	2200	1.51	.50	.55	2.75	1.06	19.29	12.29	20.47	13.48	1.42	.72	3.23	6.00
1/2 x 9	1031957	2200	1.71	.50	.55	2.75	1.06	25.29	15.29	26.48	16.48	1.42	.72	3.23	9.00
1/2 x 12	1031975	2200	2.08	.50	.55	2.75	1.06	31.29	18.29	32.48	19.48	1.42	.72	3.23	12.00
5/8 x 6	1031993	3500	2.35	.63	.82	3.50	1.31	20.99	13.74	22.53	15.28	1.80	.88	3.90	6.00
5/8 x 9	1032019	3500	3.17	.63	.82	3.50	1.31	26.99	16.74	28.53	18.28	1.80	.88	3.90	9.00
5/8 x 12	1032037	3500	3.61	.63	.82	3.50	1.31	32.99	19.74	34.53	21.28	1.80	.88	3.90	12.00
3/4 x 6	1032055	5200	4.00	.75	1.03	4.18	1.50	22.69	15.19	24.61	17.11	2.09	1.00	4.69	6.00
3/4 x 9	1032073	5200	4.75	.75	1.03	4.18	1.50	28.69	18.19	30.61	20.11	2.09	1.00	4.69	9.00
3/4 x 12	1032091	5200	5.93	.75	1.03	4.18	1.50	34.69	21.19	36.61	23.11	2.09	1.00	4.69	12.00
3/4 x 18	1032117	5200	7.00	.75	1.03	4.18	1.50	46.69	27.19	48.61	29.11	2.09	1.00	4.69	18.00
7/8 x 12	1032135	7200	8.36	.88	1.23	4.85	1.75	36.09	22.34	38.32	24.57	2.38	1.25	5.10	12.00
7/8 x 18	1032153	7200	9.75	.88	1.23	4.85	1.75	48.09	28.34	50.32	30.57	2.38	1.25	5.10	18.00
1 x 6	1032171	10000	8.92	1.00	1.31	5.53	2.06	26.34	18.34	28.89	20.89	3.00	1.44	6.36	6.00
1 x 12	1032199	10000	11.20	1.00	1.31	5.53	2.06	38.34	24.34	40.89	26.89	3.00	1.44	6.36	12.00
1 x 18	1032215	10000	13.30	1.00	1.31	5.53	2.06	50.34	30.34	52.89	32.89	3.00	1.44	6.36	18.00
1 x 24	1032233	10000	17.00	1.00	1.31	5.53	2.06	62.34	36.34	64.89	38.89	3.00	1.44	6.36	24.00
1-1/4 x 12	1032251	15200	19.42	1.25	1.86	7.21	2.81	41.32	26.82	44.55	30.05	3.56	1.81	7.72	12.00
1-1/4 x 18	1032279	15200	24.18	1.25	1.86	7.21	2.81	53.32	32.82	56.05	36.05	3.56	1.81	7.72	18.00
1-1/4 x 24	1032297	15200	28.50	1.25	1.86	7.21	2.81	65.32	38.82	68.55	42.05	3.56	1.81	7.72	24.00
1-1/2 x 12	1032313	21400	28.99	1.50	2.25	7.88	2.81	43.50	28.50	47.25	32.25	4.06	2.12	8.62	12.00
1-1/2 x 18	1032331	21400	35.00	1.50	2.25	7.88	2.81	55.50	34.50	59.25	38.25	4.06	2.12	8.62	18.00
1-1/2 x 24	1032359	21400	39.18	1.50	2.25	7.88	2.81	67.50	40.50	71.25	44.25	4.06	2.12	8.62	24.00
1-3/4 x 18	1032395	28000	53.75	1.75	2.60	9.40	3.38	55.38	37.38	59.78	41.78	4.62	2.38	10.00	18.00
1-3/4 x 24	1032411	28000	60.68	1.75	2.60	9.40	3.38	67.38	43.38	71.78	47.78	4.62	2.38	10.00	24.00
2 x 24	1032439	37000	89.00	2.00	2.62	11.86	3.69	72.62	48.62	77.95	53.95	5.75	2.69	13.09	24.00
2-1/2 x 24	1032457	60000	150.00	2.50	3.06	13.56	4.44	75.80	51.80	82.40	58.40	6.50	3.12	13.78	24.00
2-3/4 x 24	1032475	75000	183.00	2.75	3.68	15.22	4.19	77.88	53.88	85.50	61.50	7.00	3.25	15.22	24.00

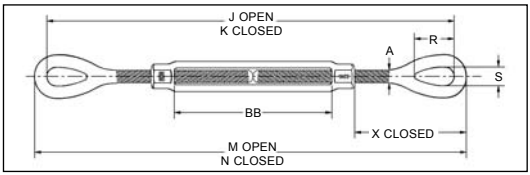
*Proof Load is 2.5 times the Working Load Limit. Ultimate Load is 5 times Working Load Limit.

Eye & Eye Turnbuckles

Hanes SUPPLY, INC.
YOUR SLING AND RIGGING SPECIALIST

HG-226
EYE & EYE

Meets the performance requirements of Federal Specification FF-T-79 lb., Type 1, Form 1 – CLASS 4, and ASTM F-1145, except for those provisions required of the contractor.



- Hot Dip galvanized steel.
- End fittings are Quenched and Tempered, bodies heat treated by normalizing.
- Turnbuckle eyes are forged elongated, by design, to maximize easy attachment in system and minimize stress in the eye. For turnbuckle sizes 1/4" through 2-1/2", a shackle one size smaller can be reeved through eye.
- TURNBUCKLES RECOMMENDED FOR STRAIGHT OR IN-LINE PULL ONLY.
- Modified UNJ thread on end fittings for improved fatigue properties. Body has UNC threads.
- Lock Nuts available for all sizes.
- Fatigue Rated.

Fatigue Rated

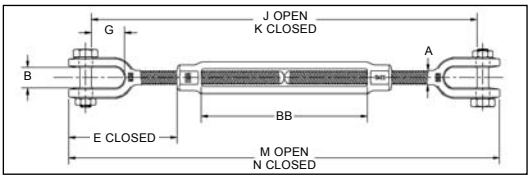
THREAD DIAMETER & TAKE UP (IN.)	STOCK NO. GALV.	WORKING LOAD LIMIT* (LBS.)	WEIGHT EACH (LBS.)	DIMENSIONS (IN)								
				A	J OPEN	K CLOSED	M OPEN	N CLOSED	R	S	X CLOSED	BB
1/4 x 4	1031252	500	.26	.25	11.80	7.80	12.25	8.25	.78	.34	1.75	4.00
5/16 x 4-1/2	1031270	800	.45	.31	13.56	9.06	14.12	9.62	.94	.44	2.09	4.50
3/8 x 6	1031298	1200	.76	.38	17.47	11.47	18.16	12.16	1.12	.53	2.52	6.00
1/2 x 6	1031314	2200	1.54	.50	20.08	13.08	20.96	13.96	1.42	.72	3.23	6.00
1/2 x 9	1031332	2200	1.13	.50	26.08	16.08	26.96	16.96	1.42	.72	3.23	9.00
1/2 x 12	1031350	2200	2.14	.50	32.08	19.08	32.96	19.96	1.42	.72	3.23	12.00
5/8 x 6	1031378	3500	3.28	.63	21.93	14.68	22.93	15.68	1.80	.88	3.90	6.00
5/8 x 9	1031396	3500	2.83	.63	27.93	17.68	28.93	18.68	1.80	.88	3.90	9.00
5/8 x 12	1031412	3500	3.42	.63	33.93	20.68	34.93	21.68	1.80	.88	3.90	12.00
3/4 x 6	1031430	5200	3.79	.75	23.88	16.38	25.12	17.62	2.09	1.00	4.69	6.00
3/4 x 9	1031458	5200	4.61	.75	29.88	19.38	31.12	20.62	2.09	1.00	4.69	9.00
3/4 x 12	1031476	5200	5.48	.75	35.88	22.38	37.12	23.62	2.09	1.00	4.69	12.00
3/4 x 18	1031494	5200	7.19	.75	47.88	28.38	49.12	29.62	2.09	1.00	4.69	18.00
7/8 x 12	1031519	7200	7.22	.88	37.07	23.32	38.57	24.82	2.38	1.25	5.10	12.00
7/8 x 18	1031537	7200	9.95	.88	49.07	29.32	50.57	30.82	2.38	1.25	5.10	18.00
1 x 6	1031555	10000	9.04	1.00	27.97	19.97	29.72	21.72	3.00	1.44	6.36	6.00
1 x 12	1031573	10000	11.50	1.00	39.97	25.97	41.97	27.72	3.00	1.44	6.36	12.00
1 x 18	1031591	10000	14.00	1.00	51.97	31.97	53.72	33.72	3.00	1.44	6.36	18.00
1 x 24	1031617	10000	17.25	1.00	63.97	37.97	65.82	39.72	3.00	1.44	6.36	24.00
1-1/4 x 12	1031635	15200	19.00	1.25	42.81	28.31	45.06	30.56	3.56	1.81	7.72	12.00
1-1/4 x 18	1031653	15200	23.00	1.25	54.81	34.31	57.06	36.56	3.56	1.81	7.72	18.00
1-1/4 x 24	1031671	15200	27.00	1.25	66.81	40.31	69.06	42.56	3.56	1.81	7.72	24.00
1-1/2 x 12	1031699	21400	27.50	1.50	45.50	30.50	48.00	33.00	4.06	2.12	8.62	12.00
1-1/2 x 18	1031715	21400	31.00	1.50	57.50	36.50	60.00	39.00	4.06	2.12	8.62	18.00
1-1/2 x 24	1031733	21400	37.50	1.50	69.50	42.50	72.00	45.00	4.06	2.12	8.62	24.00
1-3/4 x 18	1031779	28000	52.50	1.75	57.38	39.38	60.38	42.38	4.62	2.38	10.00	18.00
1-3/4 x 24	1031797	28000	58.00	1.75	69.38	45.38	72.38	48.38	4.62	2.38	10.00	24.00
2 x 24	1031813	37000	85.25	2.00	75.69	51.69	79.19	55.19	5.75	2.69	13.09	24.00
2-1/2 x 24	1031831	60000	144.25	2.50	78.62	54.62	82.62	58.62	6.50	3.12	13.78	24.00
2-3/4 x 24	1031859	75000	194.00	2.75	81.00	57.00	85.50	61.50	7.00	3.25	15.22	24.00

*Proof Load is 2.5 times the Working Load Limit. Ultimate Load is 5 times Working Load Limit.

Jaw & Jaw Turnbuckles

HG-228
JAW & JAW

Meets the performance requirements of Federal Specification FF-T-79 lb., Type 1, Form 1 – CLASS 7, and ASTM F-1145, except for those provisions required of the contractor.



- Hot Dip galvanized steel.
- End fittings are Quenched and Tempered, bodies heat treated by normalizing.
- TURNBUCKLES RECOMMENDED FOR STRAIGHT OR IN-LINE PULL ONLY.
- Forged jaw ends are fitted with bolts and nuts for 1/4" through 5/8", and pins and cotters on 3/4" through 2-3/4" sizes.
- Modified UNJ thread on end fittings for improved fatigue properties. Body has UNC threads.
- Lock Nuts available for all sizes.
- Fatigue Rated.

Fatigue Rated®

THREAD DIAMETER & TAKE UP (IN.)	STOCK NO. GALV.	WORKING LOAD LIMIT* (LBS.)	WEIGHT EACH (LBS.)	DIMENSIONS (IN)								
				A	B	E CLOSED	G	J OPEN	K CLOSED	M OPEN	N CLOSED	BB
1/4 x 4	1032493	500	.36	.25	.45	1.58	.62	10.90	6.90	11.90	7.90	4.00
5/16 X 4-1/2	1032518	800	.52	.31	.50	1.98	.87	12.36	8.36	13.90	9.40	4.50
3/8 X 6	1032536	1200	.81	.38	.54	2.12	.87	16.14	10.14	17.38	11.38	6.00
1/2 X 6	1032554	2200	1.56	.50	.55	2.75	1.06	18.50	11.50	20.00	13.00	6.00
1/2 X 9	1032572	2200	1.74	.50	.55	2.75	1.06	24.50	14.50	26.00	16.00	9.00
1/2 X 12	1032590	2200	2.40	.50	.55	2.75	1.06	30.50	17.50	32.00	19.00	12.00
5/8 X 6	1032616	3500	2.72	.63	.82	3.50	1.31	20.05	12.80	22.13	14.88	6.00
5/8 X 9	1032634	3500	3.43	.63	.82	3.50	1.31	26.05	15.80	28.13	17.88	9.0
5/8 X 12	1032652	3500	3.91	.63	.82	3.50	1.31	32.05	18.80	34.13	20.88	12.00
3/4 X 6	1032670	5200	4.11	.75	1.03	4.18	1.50	21.50	14.00	24.10	16.60	6.00
3/4 X 9	1032698	5200	5.46	.75	1.03	4.18	1.50	27.50	17.00	30.10	19.60	9.00
3/4 X 12	1032714	5200	6.43	.75	1.03	4.18	1.50	33.50	20.00	36.10	22.60	12.00
3/4 X 18	1032732	5200	8.07	.75	1.03	4.18	1.50	45.50	26.00	48.10	28.60	18.00
7/8 X 12	1032750	7200	8.17	.88	1.23	4.85	1.75	35.11	21.36	38.07	24.32	12.00
7/8 X 18	1032778	7200	10.78	.88	1.23	4.85	1.75	47.00	27.36	50.07	30.32	18.00
1 X 6	1032796	10000	10.18	1.00	1.31	5.53	2.06	24.72	16.72	28.06	20.06	6.00
1 X 12	1032812	10000	12.52	1.00	1.31	5.53	2.06	36.72	22.72	40.06	26.06	12.00
1 X 18	1032830	10000	15.14	1.00	1.31	5.53	2.06	48.72	28.72	52.06	32.06	18.00
1 X 24	1032858	10000	18.08	1.00	1.31	5.53	2.06	60.72	34.72	64.06	38.06	24.00
1-1/4 X 12	1032876	15200	20.59	1.25	1.86	7.21	2.81	39.84	25.34	44.04	29.54	12.00
1-1/4 X 18	1032894	15200	24.68	1.25	1.86	7.21	2.81	51.84	31.34	56.04	35.54	18.00
1-1/4 X 24	1032910	15200	28.20	1.25	1.86	7.21	2.81	63.84	37.34	68.04	41.54	24.00
1-1/2 X 12	1032938	21400	30.69	1.50	2.25	7.88	2.81	51.50	26.50	46.50	31.50	12.00
1-1/2 X 18	1032956	21400	36.75	1.50	2.25	7.88	2.81	53.50	32.50	58.50	37.50	18.00
1-1/2 X 24	1032974	21400	40.67	1.50	2.25	7.88	2.81	65.50	38.50	70.50	43.50	24.00
1-3/4 X 18	1033018	28000	54.00	1.75	2.60	9.40	3.38	53.38	35.38	59.18	41.18	18.00
1-3/4 X 24	1033036	28000	63.36	1.75	2.60	9.40	3.38	65.38	41.38	71.18	47.18	24.00
2 X 24	1033054	37000	94.25	2.00	2.62	11.86	3.69	69.54	45.54	76.72	52.72	24.00
2-1/2 X 24	1033072	60000	165.00	2.50	3.06	13.56	4.44	72.98	48.98	82.18	58.18	24.00
2-3/4 X 24	1033090	75000	198.00	2.75	3.68	15.22	4.19	74.75	50.75	85.50	61.50	24.00

*Proof Load is 2.5 times the Working Load Limit. Ultimate Load is 5 times Working Load Limit.

Wire Rope Thimbles

Hanes SUPPLY, INC.
YOUR SLING AND RIGGING SPECIALIST

STANDARD WIRE ROPE THIMBLES

GALVANIZED STEEL

ROPE DIAMETER (IN)	DIMENSIONS (IN)						WEIGHT POUNDS PER 100
	OVERALL LENGTH	OVERALL WIDTH	LENGTH INSIDE	WIDTH INSIDE	INSIDE WIDTH OF SCORE	MAX. PIN DIAM.	
1/8	1-15/16	1-1/16	1-5/16	11/16	5/32	5/8	3.30
3/16	1-15/16	1-1/16	1-5/16	11/16	7/32	5/8	3.30
1/4	1-15/16	1-1/16	1-5/16	11/16	9/32	5/8	3.30
5/16	2-1/8	1-1/4	1-1/2	13/16	3/8	3/4	4.00
3/8	2-3/8	1-15/32	1-5/8	15/16	7/16	7/8	7.50
1/2	2-3/4	1-3/4	1-7/8	1-1/8	9/16	1-1/16	18.80
5/8	3-1/2	2-3/8	2-1/4	1-3/8	11/16	1-1/4	36.00
3/4	3-3/4	2-11/16	2-1/2	1-5/8	13/16	1-1/2	60.00
7/8	5	3-3/16	3-1/2	1-7/8	15/16	1-3/4	90.00
1	5-11/16	3-3/4	4-1/4	2-1/2	1-1/16	2-3/8	105.00
1-1/8 - 1-1/4	6-1/4	4-5/16	4-1/2	2-3/4	1-5/16	2-5/8	166.00

*Sizes available in open pattern.

G-411
STANDARD

Recommended for light duty service. G-411 meets Federal Specification FF-T-276b Type II.

EXTRA HEAVY WIRE ROPE THIMBLES

GALVANIZED AND STAINLESS STEEL

ROPE DIAMETER (IN)	DIMENSIONS (IN)						WEIGHT POUNDS PER 100
	OVERALL LENGTH	OVERALL WIDTH	LENGTH INSIDE	WIDTH INSIDE	OVERALL THICK-NESS	MAX. PIN DIAM.	
*1/4	2-3/16	1-1/2	1-5/8	7/8	13/32	13/16	7.50
*5/16	2-1/2	1-13/16	1-7/8	1-1/16	1/2	15/16	14.00
*3/8	2-7/8	2-1/8	2-1/8	1-1/8	21/32	1-1/16	25.00
7/16	3-1/4	2-3/8	2-3/8	1-1/4	3/4	1-3/16	36.00
*1/2	3-5/8	2-3/4	2-3/4	1-1/2	27/32	1-7/16	51.00
9/16	3-5/8	2-11/16	2-3/4	1-1/2	29/32	1-7/16	51.00
*5/8	4-1/4	3-1/8	3-1/4	1-3/4	1	1-5/8	75.00
*3/4	5	3-3/16	3-3/4	2	1-1/4	1-7/8	147.00
7/8	5-1/2	4-1/4	4-1/4	2-1/4	1-3/8	2-1/8	185.00
1	6-1/8	4-15/16	4-1/2	2-1/2	1-9/16	2-3/8	291.66
1-1/8 - 1-1/4	7	5-7/8	5-1/8	2-7/8	1-7/8	2-3/4	383.33
1-1/4 - 1-3/8	9-1/16	6-13/16	6-1/2	3-1/2	2-1/4	3-1/4	816.66
1-3/8 - 1-1/2	9	7-1/8	6-1/4	3-1/2	2-5/8	3-3/8	1,166.66
1-5/8	11-1/4	8-1/8	8	4	2-3/4	3-7/8	1,625.00
1-3/4	12-3/16	8-1/2	9	4-1/2	2-7/8	4-3/8	1,837.50
1-7/8 - 2	15-1/8	10-3/8	12	6	3-1/8	5-7/8	2,575.00
2-1/4	17-1/8	11-7/8	14	7	3-5/8	6-7/8	3,850.00

*Sizes available in Stainless (304) Steel.

G-414 and SS-414
STAINLESS STEEL

EXTRA HEAVY
Rugged rope thimbles recommended for heavy duty service. Thimbles G-414 meet Federal Specification FF-T-276b Type III.

SOLID WIRE ROPE THIMBLES

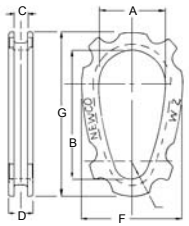
ROPE DIAMETER (IN)	DIMENSIONS (IN)				WEIGHT POUNDS EACH
	OVERALL LENGTH	OVERALL WIDTH	THICKNESS	MAXIMUM PIN. DIAM.	
1/2	2-13/16	2-1/8	7/8	1	1.0
5/8	4-11/16	3-3/8	1-1/8	1-3/16	2.5
3/4	4-11/16	3-3/8	1-3/8	1-3/8	3.3
7/8	6-1/16	4-1/2	1-5/8	1-5/8	5.0
1	6-1/16	4-1/2	1-13/16	2	6.5
1-1/8	7-1/4	5-3/8	2-1/16	2-1/4	8.5
1-1/4 - 1-3/8	7-1/4	5-3/8	2-5/16	2-1/2	10.0

S-412

SOLID
Fits open wire rope socket, boom pendant clevis, as well as wedge socket.

SLIP-THRU THIMBLE

NEWCO SLIP-TRHU THIMBLES are designed to allow passage of an identical thimble through its eye. This is a necessity when a regular sling is used as a choker sling. SLIP-THRU THIMBLES also prevent the eye of the sling from mashing together and the top of the eye wearing excessively. The generous inside dimensions allow the thimbles to fit large crane hooks.

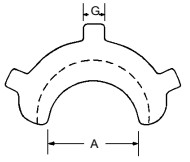


DIMENSIONS AND DATA												
THIMBLE CODE	SLING SIZE				DIMENSION (IN)							WT. (LBS)
	SINGLE	8 PTS.	6 PTS.	4 PTS.	A	B	C	D	E^R	F	G	
*W-2	5/16 - 3/8	3/32 - 1/8	3/32 - 1/8	1/8 - 3/16	2-1/8	4-1/8	7/16	13/16	9/16	3-1/4	5-1/4	1.3
W-3	1/2 - 9/16	3/16	3/16	1/4	2-3/8	4-3/8	5/8	1	5/8	4	6	1.15
W-4	5/8 - 3/4	1/4	1/4 - 5/16	5/16 - 1/8	3-3/8	6-5/8	13/16	1-5/16	5/8	5-3/8	8-1/2	3.11
W-5	7/8 - 1	5/16	3/8	7/16 - 1/2	3-3/4	7-1/8	1-1/8	1-5/8	7/8	6-1/4	9-3/8	5.6
W-6	1-1/8 - 1-1/4	3/8	7/16	9/16 - 5/8	4-3/8	8-3/8	1-3/8	1-7/8	1	7-1/8	11	8.6
W-7	1-3/8 - 1-1/2	7/16 - 1/2	1/2	3/4	5	9-1/2	1-5/8	2-1/8	1-1/4	8-1/8	12-1/2	11.1
W-8	1-5/8 - 1-3/4	9/16	5/8	7/8	6-3/4	11-3/4	1-13/16	2-9/16	1-7/16	9-3/8	14-3/4	17.6
W-9	1-7/8 - 2	5/8	3/4	1	8	14-1/2	2-1/8	3-1/4	1-7/8	13	19-1/4	53
W-10	2-1/8 - 2-1/4	1/4	7/8 - 1	1-1/8 - 1-1/4	8	15-1/2	2-1/2	3-3/4	2	13	20-1/8	66
W-11	2-1/2 - 3	7/8 - 1	1-1/8	1-1/4 - 1-3/8 - 1-1/2	9	18-1/2	3-3/16	4-11/16	2-1/2	15-3/4	24-3/4	126

*Made from High Tensile Malleable.

CRESCENT THIMBLE

Designed to protect the bearing surface of a loop where a large dimension loop is necessary. The ears are tapered so that they can be bent over. Standard-Laid Rope Size 3/8" to 3".



DIMENSIONS AND DATA													
THIMBLE CODE	ROPE SIZE				DIMENSION (IN)								WT. (LBS)
	SINGLE	8 PTS.	6 PTS.	4 PTS.	A	B	C	D	E	F	G	H	
6C	3/8 - 7/16	3/32 - 1/8	1/8	1/8 - 3/16	2	1	27/32	15/32	2-1/16	3/8	1/2	3/8	.75
8C	1/2 - 9/16	3/16	3/16	1/4	2-1/4	1-1/8	1	5/8	2-1/2	1/2	1/2	1/2	1.0
9C	5/8	–	1/4	5/16	2-3/4	1-3/8	1-5/32	23/32	3	19/32	9/16	19/32	1.2
10C	3/4	1/4	5/16	3/8	3-1/4	1-5/8	1-5/16	13/16	3-1/2	5/8	5/8	5/8	2.0
14C	7/8	–	–	7/16	4-1/2	2-1/4	1-7/16	15/16	4-5/16	3/4	11/16	3/4	3.3
16C	1	5/16	3/8	1/2	4-1/2	2-1/4	1-9/16	1-1/16	4-19/32	13/16	3/4	7/8	3.8
18C	1-1/8	3/8	7/16	9/16	4-7/8	2-7/16	1-13/16	1-1/4	5-1/32	7/8	7/8	1	5.0
20C	1-1/4	7/16	1/2	5/8	5-1/2	2-3/4	2-1/16	1-7/16	5-3/4	15/16	15/16	1-1/8	6.8
22C	1-3/8 - 1-1/2	1/2	9/16	3/4	6	3	2-1/4	1-5/8	6-1/4	1-1/16	1-1/8	1-3/16	9.0
24C	1-5/8	9/16	5/8	–	6-1/2	3-1/4	2-1/2	1-3/4	6-11/16	1-1/8	1-1/4	1-1/4	12.0
28C	1-3/4 - 1-7/8	–	–	7/8	7	3-1/2	2-15/16	1-15/16	7-3/8	1-1/4	1-3/8	1-1/2	16.6
32C	2	5/8	3/4	1	7	3-1/2	3-3/16	2-3/16	7-13/16	1-1/2	1-1/2	1-5/8	21.8
40C	2-1/4 - 2-1/2	3/4 - 7/8	1	1-1/8 - 1-1/4	8-1/2	4-1/4	4-1/8	2-7/8	9-5/8	1-5/8	1-7/8	2	39.0
48C	2-3/4 - 3	1	1-1/8	–	10	5	4-7/8	3-3/8	11-1/4	1-3/4	2-1/4	2-1/2	67.0

*Made from High Tensile Malleable.

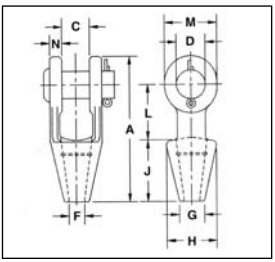
DIMENSIONS ARE IN INCHES AND ARE APPROXIMATE.

GROOVED OPEN SPELTER SOCKETS

G-416

- Forged Steel Sockets thru 1-1/2", cast alloy steel 1-5/8" thru 4".
- Spelter socket terminations have an efficiency rating of 100%, based on the catalog strength of wire rope. Ratings are based on recommended use with 6 x 7, 6 x 19, or 6 x 37, IPS or XIP (EIP), RRL, FC, or IWRC wire rope.

NOTICE: All cast steel sockets 1-5/8" and larger are magnetic particle inspected and ultrasonic inspected. Proof testing available on special order.



Note: Above drawing illustrates one groove used on sockets 1/4" thru 3/4". Sizes 7/8" thru 1-1/2" use 2 grooves. Sizes 1-5/8" and larger use 3 grooves.

Open Grooved Sockets meet the requirements of Federal Specifications RR-S-550D, Type A.

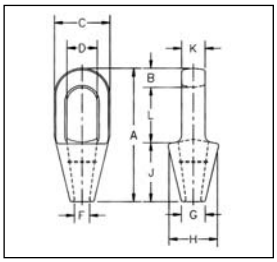
ROPE DIAMETER (IN.)	STRUCTURAL STRAND DIAM. (IN.)	STOCK NO.		WEIGHT EACH (LBS.)	DIMENSIONS (IN)									
		G-416 GALV.	S-416 S.C.		A	C	D	F	G	H	J	L	M	N
1/4	–	1039619	1039628	1.10	4.56	.91	.69	.38	.69	1.56	2.25	1.56	1.31	.36
5/16 - 3/8	–	1039637	1039646	1.30	4.84	.81	.81	.50	.81	1.69	2.25	1.75	1.50	.44
7/16 - 1/2	–	1039655	1039664	2.25	5.56	1.00	1.00	.56	.94	1.88	2.50	2.00	1.88	.50
9/16 - 5/8	1/2	1039673	1039682	3.60	6.75	1.25	1.19	.69	1.13	2.25	3.00	2.50	2.25	.56
3/4	9/16 - 5/8	1039691	1039708	5.83	7.94	1.50	1.38	.81	1.25	2.62	3.50	3.00	2.62	.62
7/8	11/16 - 3/4	1039717	1039726	9.65	9.25	1.75	1.63	.94	1.50	3.25	4.00	3.50	3.13	.80
1	13/16 - 7/8	1039735	1039744	15.50	10.56	2.00	2.00	1.13	1.75	3.75	4.50	4.00	3.75	.88
1-1/8	15/16 - 1	1039753	1039762	21.50	11.81	2.25	2.25	1.25	2.00	4.12	5.00	4.62	4.12	1.00
1-1/4 - 1-3/8	1-1/16 - 1-1/8	1039771	1039780	31.00	13.19	2.50	2.50	1.50	2.25	4.75	5.50	5.00	4.75	1.13
1-1/2	1-3/16 - 1-1/4	1039799	1039806	47.25	15.12	3.00	2.75	1.63	2.75	5.25	6.00	6.00	5.38	1.19
1-5/8	1-5/16 - 1-3/8	1039815	1039824	55.00	16.25	3.00	3.00	1.75	3.00	5.50	6.50	6.50	5.75	1.31
1-3/4 - 1-7/8	1-7/16 - 1-5/8	1039833	1039842	82.00	18.25	3.50	3.50	2.00	3.13	6.38	7.50	7.00	6.50	1.56
2 - 2-1/8	1-11/16 - 1-3/4	1039851	1039860	129.00	21.50	4.00	3.75	2.25	3.75	7.38	8.50	9.00	7.00	1.81
2-1/4 - 2-3/8	1-13/16 - 1-7/8	1039879	1039888	167.00	23.50	4.50	4.25	2.50	4.00	8.25	9.00	10.00	7.75	2.13
2-1/2 - 2-5/8	1-15/16 - 2-1/8	1041633	1041642	252.00	25.50	5.00	4.75	2.88	4.50	9.25	9.75	10.75	8.50	2.38
2-3/4 - 2-7/8	2-3/16 - 2-7/16	1041651	1041660	315.00	27.25	5.25	5.00	3.12	4.88	10.50	11.00	11.00	9.00	2.88
3 - 3-1/8	2-1/2 - 2-5/8	1041679	1041688	380.00	29.00	5.75	5.25	3.38	5.25	11.12	12.00	11.25	9.50	3.00
3-1/4 - 3-3/8	2-3/4 - 2-7/8	1041697	1041704	434.00	30.88	6.25	5.50	3.62	5.75	11.88	13.00	11.75	10.00	3.12
3-1/2 - 3-5/8	3 - 3-1/8	1041713	1041722	563.00	33.25	6.75	6.00	3.88	6.50	12.38	14.00	12.50	10.75	3.25
3-3/4 - 4	–	1041731	1041740	783.00	35.25	7.50	7.00	4.25	7.25	13.62	15.00	13.50	12.50	3.50

GROOVED CLOSED SPELTER SOCKETS

G-417

- Forged Steel Sockets thru 1-1/2", cast alloy steel 1-5/8" thru 4".
- Spelter socket terminations have an efficiency rating of 100%, based on the catalog strength of wire rope. Ratings are based on recommended use with 6 x 7, 6 x 19, or 6 x 37, IPS or XIP (EIP), RRL, FC, or IWRC wire rope.

NOTICE: All cast steel sockets 1-5/8" and larger are magnetic particle inspected and ultrasonic inspected. Proof testing available on special order.

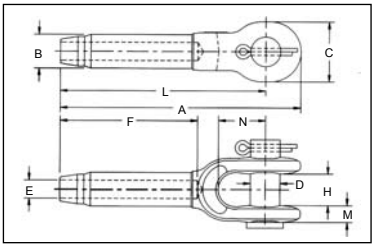


Note: Above drawing illustrates one groove used on sockets 1/4" thru 3/4". Sizes 7/8" thru 1-1/2" use 2 grooves. Sizes 1-5/8" and larger use 3 grooves.

Closed Grooved Sockets meet the requirements of Federal Specifications RR-S-550D, Type B.

ROPE DIAMETER (IN.)	STRUCTURAL STRAND DIAM. (IN.)	STOCK NO.		WEIGHT EACH (LBS.)	DIMENSIONS (IN)									
		G-417 GALV.	S-417 S.C.		A	B	C	D	F	G	H	J	K	L
1/4	–	1039897	1039904	.50	4.50	.50	1.50	.88	.38	.69	1.56	2.25	.50	1.75
5/16 - 3/8	–	1039913	1039922	.75	4.88	.62	1.69	.97	.50	.81	1.69	2.25	.69	2.00
7/16 - 1/2	–	1039931	1039940	1.50	5.44	.69	2.00	1.16	.56	.94	1.88	2.50	.88	2.25
9/16 - 5/8	1/2	1039959	1039968	2.50	6.31	.81	2.63	1.41	.69	1.12	2.38	3.00	1.00	2.50
3/4	9/16 - 5/8	1039977	1039986	4.25	7.56	1.06	3.00	1.66	.81	1.25	2.75	3.50	1.25	3.00
7/8	11/16 - 3/4	1039995	1040000	7.25	8.75	1.25	3.63	1.88	.97	1.50	3.25	4.00	1.50	3.50
1	13/16 - 7/8	1040019	1040028	10.50	9.88	1.38	4.13	2.30	1.13	1.75	3.75	4.44	1.75	4.00
1-1/8	15/16 - 1	1040037	1040046	14.25	11.00	1.50	4.50	2.55	1.25	2.00	4.13	5.00	2.00	4.50
1-1/4 - 1-3/8	1-1/16 - 1-1/8	1040055	1040064	19.75	12.12	1.63	5.30	2.80	1.50	2.25	4.75	5.50	2.25	5.00
1-1/2	1-3/16 - 1-1/4	1040073	1040082	29.20	13.94	1.94	5.33	3.19	1.63	2.75	5.25	6.00	2.50	6.00
1-5/8	1-5/16 - 1-3/8	1040091	1040108	36.00	15.13	2.13	5.75	3.25	1.75	3.00	5.50	6.50	2.75	6.50
1-3/4 - 1-7/8	1-7/16 - 1-5/8	1040117	1040126	57.25	17.25	2.19	6.75	3.75	2.00	3.13	6.38	7.50	3.00	7.56
2 - 2-1/8	1-11/16 - 1-3/4	1040135	1040144	79.00	19.50	2.44	7.63	4.38	2.25	3.75	7.38	8.50	3.25	8.56
2-1/4 - 2-5/8	1-13/16 - 1-7/8	1040153	1040162	105.00	21.13	2.88	8.50	5.00	2.50	4.00	8.25	9.00	3.63	9.50
2-1/2 - 2-5/8	1-15/16 - 2-1/8	1041759	1041768	140.00	23.50	3.12	9.50	5.50	2.94	4.50	9.25	9.75	4.00	10.62
2-3/4 - 2-7/8	2-3/16 - 2-7/16	1041777	1041786	220.00	25.38	3.12	10.75	6.25	3.12	4.88	10.19	11.00	4.88	11.25
3 - 3-1/8	2-1/2 - 2-5/8	1041795	1041802	276.00	27.00	3.25	11.50	6.75	3.38	5.25	11.50	12.00	5.25	11.75
3-1/4 - 3-3/8	2-3/4 - 2-7/8	1041811	1041820	313.00	29.25	4.00	12.25	7.25	3.62	5.75	12.25	13.00	5.75	12.25
3-1/2 - 3-5/8	3 - 3-1/8	1041839	1041848	400.00	31.00	4.00	13.00	7.75	3.88	6.50	13.00	14.00	6.25	13.00
3-3/4 - 4	–	1041857	1041866	542.00	33.25	4.25	14.25	8.50	4.25	7.25	14.25	15.00	7.00	14.00

OPEN SWAGE SOCKET



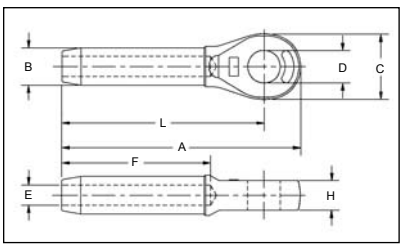
S-501

- Forged from special bar quality carbon steel, suitable for cold forming.
- Hardness controlled by spheriodize annealing.
- Swage Socket terminations have an efficiency rating of 100% based on the catalog strength of wire rope.

NOTE: S-501 Swage Sockets are recommended for use with 6 x 19, or 6 x 37, IPS or XIP (EIP), RRL, FC, or IWRC wire rope.

S-501 OPEN SOCKET SPECIFICATIONS														PRESS / DIE DATA				
			BEFORE SWAGE DIMENSIONS										MAX. AFTER SWAGE		STOCK NO.		SIDE LOAD	
STOCK NO.	ROPE SIZE (IN.)	WEIGHT EACH (LBS.)	A	B	C	D	E	F	H	L	M	N	DIM. (IN.)	DIE DESCRIP. (SOCKET)	500 TON 1000 TON 1500 TON 5 X 7	1500 TON 3000TON 6 X 12	1500 TONS 6 X 12	3000 TONS 6 X 12
1039021	1/4	.52	4.81	.50	1.38	.69	.27	2.13	.69	4.00	.38	1.50	.46	1/4	1192845	–	–	–
1039049	5/16	1.12	6.25	.77	1.62	.81	.34	3.19	.81	5.31	.47	1.75	.71	5/16 - 3/8	1192863	–	–	–
1039067	3/8	1.30	6.25	.77	1.62	.81	.41	3.19	.81	5.31	.47	1.75	.71	5/16 - 3/8	1192863	–	–	–
1039085	7/16	2.08	7.81	.98	2.00	1.00	.48	4.25	1.00	6.69	.56	2.00	.91	7/16 - 1/2	1192881	–	–	–
1039101	1/2	2.08	7.81	.98	2.00	1.00	.55	4.25	1.00	6.69	.56	2.00	.91	7/16 - 1/2	1192881	–	–	–
1039129	9/16	4.67	9.50	1.25	2.38	1.19	.61	5.31	1.25	8.13	.66	2.25	1.16	9/16 - 5/8	1192907	–	–	–
1039147	5/8	4.51	9.50	1.25	2.38	1.19	.67	5.31	1.25	8.13	.66	2.25	1.16	9/16 - 5/8	1192907	–	–	–
1039165	3/4	7.97	11.56	1.55	2.75	1.38	.80	6.38	1.50	10.00	.75	2.75	1.42	3/4	1192925	–	–	–
1039183	7/8	11.52	13.41	1.70	3.13	1.62	.94	7.44	1.75	11.63	.94	3.25	1.55	7/8	1192949	–	–	–
1039209	1	17.80	15.47	1.98	3.69	2.00	1.06	8.50	2.00	13.38	1.06	3.75	1.80	1	1192961	–	–	–
1039227	1-1/8	25.25	17.31	2.25	4.06	2.25	1.19	9.56	2.25	15.00	1.19	4.25	2.05	1-1/8	1192989	–	–	–
1039245	1-1/4	35.56	19.06	2.53	4.50	2.50	1.33	10.63	2.50	16.50	1.22	4.75	2.30	1-1/4	1193005	–	–	–
1039263	1-3/8	43.75	20.94	2.80	5.00	2.50	1.45	11.69	2.50	18.13	1.38	5.25	2.56	1-3/8	1193023	–	–	–
1039281	1-1/2	58.50	22.88	3.08	5.50	2.75	1.58	12.75	3.00	19.75	1.69	5.75	2.81	1-1/2	1193041	1191267	1195355	1195192
1039307	1-3/4	88.75	26.63	3.39	6.25	3.50	1.86	14.88	3.50	23.00	2.11	6.75	3.06	1-3/4	1193069	1191276	1195367	1195209
1042767	2	146.25	31.44	3.94	8.00	3.75	2.11	17.00	4.00	26.88	2.37	8.00	3.56	2	1193087	1191294	1195379	1195218

CLOSED SWAGE SOCKET



S-502

- Forged from special bar quality carbon steel, suitable for cold forming.
- Hardness controlled by spheriodize annealing.
- Swage Socket terminations have an efficiency rating of 100% based on the catalog strength of wire rope.

NOTE: S-502 Swage Sockets are recommended for use with 6 x 19, or 6 x 37, IPS or XIP (EIP), RRL, FC, or IWRC wire rope.

S-502 CLOSED SOCKET SPECIFICATIONS												PRESS / DIE DATA				
			BEFORE SWAGE DIMENSIONS								MAX. AFTER SWAGE DIM. (IN.)		STOCK NO.		SIDE LOAD	
STOCK NO.	ROPE SIZE (IN.)	WEIGHT EACH (LBS.)	A	B	C	D	E	F	H	L		DIE DESCRIP. (SOCKET)	500 TON 1000 TON 1500 TON 5 X 7	1500 TON 3000TON 6 X 12	1500 TONS 6 X 12	3000 TONS 6 X 12
1039325	1/4	.33	4.31	.50	1.38	.75	.27	2.12	.50	3.50	.46	1/4	1192845	–	–	–
1039343	5/16	.75	5.44	.77	1.62	.88	.34	3.19	.67	4.50	.71	5/16 - 3/8	1192863	–	–	–
1039361	3/8	.72	5.44	.77	1.62	.88	.41	3.19	.67	4.50	.71	5/16 - 3/8	1192863	–	–	
1039389	7/16	1.42	6.91	.98	2.00	1.06	.48	4.25	.86	5.75	.91	7/16 - 1/2	1192881	–	–	–
1039405	1/2	1.42	6.91	.98	2.00	1.06	.55	4.25	.86	5.75	.91	7/16 - 1/2	1192881	–	–	–
1039423	9/16	2.92	8.66	1.25	2.38	1.25	.61	5.31	1.13	7.25	1.16	9/16 - 5/8	1192907	–	–	–
1039441	5/8	2.85	8.66	1.25	2.38	1.25	.67	5.31	1.13	7.25	1.16	9/16 - 5/8	1192907	–	–	–
1039469	3/4	5.00	10.28	1.55	2.88	1.44	.80	6.38	1.31	8.63	1.42	3/4	1192925	–	–	–
1039487	7/8	6.80	11.94	1.70	3.12	1.69	.94	7.44	1.50	10.13	1.55	7/8	1192949	–	–	–
1039502	1	10.40	13.56	1.98	3.63	2.06	1.06	8.50	1.75	11.50	1.80	1	1192961	–	–	–
1096520	1-1/8	14.82	15.03	2.25	4.00	2.31	1.19	9.56	2.00	12.75	2.05	1-1/8	1192989	–	–	–
1039548	1-1/4	21.57	16.94	2.53	4.50	2.56	1.33	10.63	2.25	14.38	2.30	1-1/4	1193005	–	–	–
1039566	1-3/8	28.54	18.63	2.80	5.00	2.56	1.45	11.69	2.25	15.75	2.56	1-3/8	1193023	–	–	–
1039584	1-1/2	38.06	20.12	3.08	5.50	2.81	1.58	12.75	2.50	17.00	2.81	1-1/2	1193041	1191267	1193355	1195192
1039600	1-3/4	51.00	23.56	3.39	6.25	3.56	1.86	14.88	3.00	20.00	3.06	1-3/4	1193069	1191276	1195367	1195209
1042589	2	89.25	27.62	3.94	7.25	3.81	2.11	17.00	3.25	23.00	3.56	2	1193087	1191294	1195379	1195218

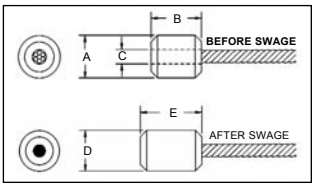
Swage Buttons / Socket Compound

Hanes SUPPLY, INC.
YOUR SLING AND RIGGING SPECIALIST

S-409 SWAGE BUTTONS

- Low carbon steel
- Spherodize annealed
- Quality controlled
- Economical to use

A multi-purpose fitting for many swaging applications. Manufactured from a special analysis high quality, low carbon steel, and later heat treated. They are precision made with constant quality control checks throughout all stages of manufacturing to assure the best in quality and performance.



ITEM	ROPE DIAMETER	DIMENSIONS (IN)				
		A	B	C	D	E
1 SB	1/8	27/64	1/2	.141	3/8	39/64
2 SB	5/32	1/2	39/64	.172	7/16	23/32
3 SB	3/16	9/16	45/64	.203	1/2	27/32
4 SB	7/32	41/64	13/16	.234	9/16	31/32
5 SB	1/4	41/64	1-1/16	.296	9/16	1-13/64
6 SB	9/32	49/64	1-1/32	.313	11/16	1-13/64
7 SB	5/16	27/32	1-1/8	.358	3/4	1-21/64
8 SB	3/8	27/32	1-31/64	.421	3/4	1-11/16
9 SB	7/16	1-1/8	1-5/8	.484	1	1-15/16
10 SB	1/2	1-17/64	1-57/64	.547	1-1/8	2-11/64
11 SB	9/16	1-13/32	2-1/64	.609	1-1/4	2-13/32
12 SB	5/8	1-35/64	2-27/64	.672	1-3/8	2-57/64
13 SB	3/4	1-11/16	2-47/64	.796	1-1/2	3-1/4
14 SB	7/8	1-31/32	3-17/64	.936	1-3/4	3-55/64
15 SB	1	2-1/4	3-43/64	1.061	2	4-23/64
16 SB	1-1/8	2-17/32	4-3/64	1.188	2-1/4	4-23/64
17 SB	1-1/4	2-13/16	4-37/64	1.328	2-1/2	5-27/64
18 SB	1-3/8	3-3/32	5-5/64	1.453	2-3/4	6-1/32
19 SB	1-1/2	3-3/8	5-15/32	1.578	3	6-33/64

NOTE: Length is measured from outside end of terminal.

WIRELOCK® - RESIN FOR SPELTER SOCKETS

W416-7

- Ideal for on-site applications
- Improved fatigue life
- For use on 416 & 417 Spelter Sockets only
- 100% termination efficiency
- Temperature operating range from -65°F to +240°F
- One Booster pack needed if pouring temperature is 35°F to 48°F
- Two Booster packs needed if pouring temperature is 27°F to 35°F

APPROXIMATE U.S. MEASUREMENTS

250cc Kit	1 Cup
500cc Kit	1 Pint
1,000cc Kit	1 Quart

NATO NUMBERS

100cc	8030-21-902-1823
250cc	8030-21-902-1824
500cc	8030-21-902-1825
1,000cc	8030-21-902-1826

Witnessed and tested by American Bureau of Shipping (ABS)

AMOUNT OF WIRELOCK® REQUIRED			
WIRE ROPE SIZE (IN.)	WIRELOCK® REQUIRED (CC)	WIRE ROPE SIZE (IN.)	WIRELOCK® REQUIRED (CC)
1/4	9	1-3/4	700
5/16	17	1-7/8	700
3/8	17	2	1265
7/16	35	2-1/8	1265
1/2	35	2-1/4	1410
9/16	52	2-3/8	1410
5/8	52	2-1/2	1830
3/4	86	2-5/8	1830
7/8	125	2-3/4	2250
1	160	3	3160
1-1/8	210	3-1/4	3795
1-1/4	350	3-1/2	4920
1-3/8	350	3-3/4	5980
1-1/2	420	4	7730
1-5/8	495		

W416-7 KITS				BOOSTER
KIT SIZE	KITS PER CASE	STOCK NO.	WT. EACH (LBS.)	PACK STOCK NO.
100 CC	20	1039602	.62	1039603
250 CC	12	1039604	1.25	1039605
500 CC	12	1039606	2.54	1039607
1000 CC	12	1039608	4.59	1039609
2000 CC	12	1039610	9.00	1039611

FORGED EYE BOLT

WARNINGS AND APPLICATION INSTRUCTIONS

Regular Nut Eye Bolt **G-291**

Shoulder Nut Eye Bolt **G-277**

Machinery Eye Bolt **G-279**

Important Safety Information – Read and Follow

Inspection/Maintenance Safety

- Always inspect eye bolt before use.
- Never use eye bolt that shows signs of wear or damage.
- Never use eye bolt if eye or shank is bent or elongated.
- Always be sure threads on shank and receiving holes are clean.
- Never machine, grind, or cut eye bolt.

Assembly Safety

- Never exceed load limits specified in Table I.
- Never use regular nut eye bolts for angular lifts.
- Always use shoulder nut eye bolts (or machinery eye bolts) for angular lifts.
- For angular lifts, adjust working load as follows:

DIRECTION OF PULL	ADJUSTED WORKING LOAD
45 degrees	30% of rated working load
90 degrees	25% of rated working load

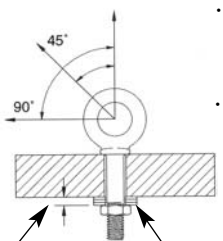
- Never undercut eye bolt to seat shoulder against the load.
- Always countersink receiving hole or use washers to seat shoulder.
- Always screw eye bolt down completely for proper seating.
- Always tighten nuts securely against the load.

⚠ WARNING

- **Loads may slip or fall if proper eye bolt assembly and lifting procedures are not used.**
- **A falling load can seriously injure or kill.**
- **Read, understand and follow all eye bolt safety information and diagrams presented here.**

TABLE I (IN-LINE LOAD)	
Size (in.)	**Working Load Limit (lbs.)**
1/4	650
5/16	1200
3/8	1550
1/2	2600
5/8	5200
3/4	7200
7/8	10600
1	13300
1-1/4	21000
1-1/2	24000

Shoulder Nut Eye Bolt – Installation for Angular Loading



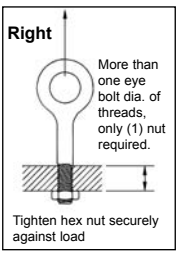
- The threaded shank must protrude through the load sufficiently to allow full engagement of the nut.
- If the eye bolt protrudes so far through the load that the nut cannot be tightened securely against the load, use properly sized washers to take up the excess space BETWEEN THE NUT AND THE LOAD.
- Thickness of spacers must exceed this distance between the bottom of the load and the last thread of the eye bolt.
- Place washers or spacers between nut and load so that when the nut is tightened securely, the shoulder is secured flush against the load surface.

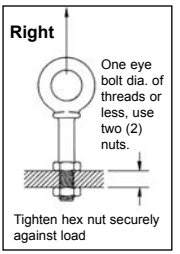
Eye Bolts

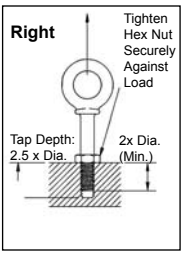
Hanes SUPPLY, INC.
YOUR SLING AND RIGGING SPECIALIST

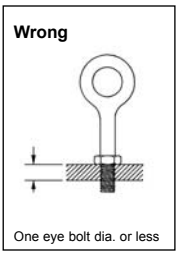
IMPORTANT – READ AND UNDERSTAND THESE INSTRUCTIONS BEFORE USING EYE BOLTS.

Regular Nut & Shoulder Nut Eye Bolt – Installation for In-Line Loading



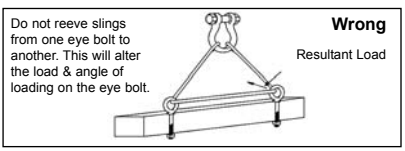


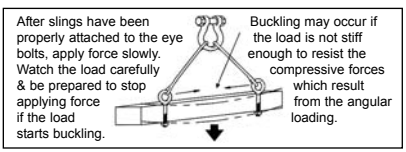




Operating Safety

- Always inspect eye bolt before use.
- Always lift load with a steady, even pull – do not jerk.
- Always apply load to eye bolt in the plane of the eye, not at an angle.
- Never exceed the capacity of the eyebolt – See Table I.
- When using lifting slings of two or more legs, make sure the loads in the legs are calculated using the angle from the vertical to the leg and properly size the shoulder nut or machinery eye bolt for the angular load.





Machinery Eye Bolt – Installation for In-Line & Angular Loading

These eye bolts are primarily intended to be installed into tapped holes.

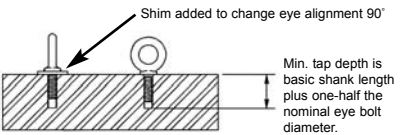
1. After the loads on the eye bolts have been calculated, select the proper size eye bolt for the job. For angular lifts, adjust working load as follows:

DIRECTION OF PULL	ADJUSTED WORKING LOAD
45 degrees	30% of rated working load
90 degrees	25% of rated working load

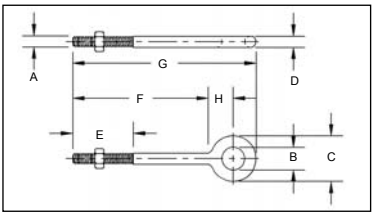
2. Drill and tap the load to the correct sizes to a minimum depth of one-half the eye bolt size beyond the shank length of the machinery eye bolt.
3. Thread the eye bolt into the load until the shoulder is flush and securely tightened against the load.
4. If the plane of the machinery eye bolt is not aligned with the sling line, estimate the amount of unthreading rotation necessary to align the plane of the eye properly.
5. Remove the machinery eye bolt from the load and add shims (washers) of proper thickness to adjust the angle of the plane of the eye to match the sling line. Use Table II to estimate the required shim thickness for the amount of unthreading rotation required.

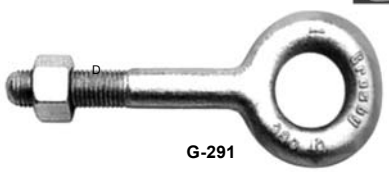
TABLE II

EYE BOLT SIZE (IN.)	SHIM THICKNESS REQUIRED TO CHANGE ROTATION 90° (IN.)
1/4	.0125
5/16	.0139
3/8	.0156
1/2	.0192
5/8	.0227
3/4	.0250
7/8	.0278
1	.0312
1-1/4	.0357
1-1/2	.0417



REGULAR NUT EYE BOLTS





G-291

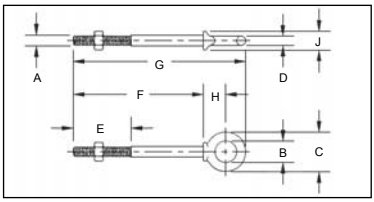
SEE APPLICATION AND WARNING INFORMATION

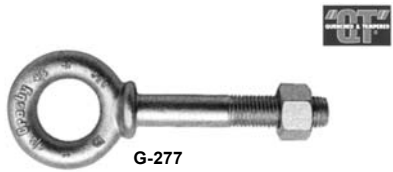
- Recommended for straight line pull.
- All Bolts Hot Dip galvanized after threading.
- Furnished with standard Hot Dip galvanized hex nuts.
- Forged Steel – Quenched and Tempered.

SHANK DIAMETER & LENGTH (IN.)	G-291 STOCK NO. GALV.	WORKING LOAD LIMIT* (LBS.)	WEIGHT PER 100 (LBS.)	DIMENSIONS (IN)							
				A	B	C	D	E	F	G	H
1/4 x 2	1043230	650	8.20	.25	.50	1.00	.25	1.50	2.00	3.06	.56
1/4 x 4	1043258	650	11.70	.25	.50	1.00	.25	2.50	4.00	5.06	.56
5/16 x 2-1/4	1043276	1200	13.30	.31	.62	1.25	.31	1.50	2.25	3.56	.69
5/16 x 4-1/4	1043294	1200	25.00	.31	.62	1.25	.31	2.50	4.25	5.56	.69
3/8 x 2-1/2	1043310	1550	23.30	.38	.75	1.50	.38	1.50	2.50	4.12	.88
3/8 x 4-1/2	1043338	1550	29.50	.38	.75	1.50	.38	2.50	4.50	6.12	.88
3/8 x 6	1043356	1550	35.20	.38	.75	1.50	.38	2.50	6.00	7.62	.88
1/2 x 3-1/4	1043374	2600	50.30	.50	1.00	2.00	.50	1.50	3.25	5.38	1.12
1/2 x 6	1043392	2600	66.10	.50	1.00	2.00	.50	3.00	6.00	8.12	1.12
1/2 x 8	1043418	2600	82.00	.50	1.00	2.00	.50	3.00	8.00	10.12	1.12
1/2 x 10	1043436	2600	88.00	.50	1.00	2.00	.50	3.00	10.00	12.12	1.12
1/2 x 12	1043454	2600	114.20	.50	1.00	2.00	.50	3.00	12.00	14.12	1.12
5/8 x 4	1043472	5200	103.10	.62	1.25	2.50	.62	2.00	4.00	6.69	1.44
5/8 x 6	1043490	5200	118.20	.62	1.25	2.50	.62	3.00	6.00	8.69	1.44
5/8 x 8	1043515	5200	135.10	.62	1.25	2.50	.62	3.00	8.00	10.69	1.44
5/8 x 10	1043533	5200	153.60	.62	1.25	2.50	.62	3.00	10.00	12.69	1.44
5/8 x 12	1043551	5200	167.10	.62	1.25	2.50	.62	4.00	12.00	14.69	1.44
3/4 x 4-1/2	1043579	7200	168.60	.75	1.50	3.00	.75	2.00	4.50	7.69	1.69
3/4 x 6	1043597	7200	184.50	.75	1.50	3.00	.75	3.00	6.00	9.19	1.69
3/4 x 8	1043613	7200	207.90	.75	1.50	3.00	.75	3.00	8.00	11.19	1.69
3/4 x 10	1043631	7200	235.00	.75	1.50	3.00	.75	3.00	10.00	13.19	1.69
3/4 x 12	1043659	7200	257.50	.75	1.50	3.00	.75	4.00	12.00	15.19	1.69
3/4 x 15	1043677	7200	298.00	.75	1.50	3.00	.75	5.00	15.00	18.19	1.69
7/8 x 5	1043695	10600	270.00	.88	1.75	3.50	.88	2.50	5.00	8.75	2.00
7/8 x 8	1043711	10600	308.00	.88	1.75	3.50	.88	4.00	8.00	11.75	2.00
7/8 x 12	1043739	10600	400.00	.88	1.75	3.50	.88	4.00	12.00	15.75	2.00
1 x 6	1043757	13300	421.00	1.00	2.00	4.00	1.00	3.00	6.00	10.31	2.31
1 x 9	1043775	13300	468.50	1.00	2.00	4.00	1.00	4.00	9.00	13.31	2.31
1 x 12	1043793	13300	540.00	1.00	2.00	4.00	1.00	4.00	12.00	16.31	2.31
1 x 18	1043819	13300	650.00	1.00	2.00	4.00	1.00	7.00	18.00	22.31	2.31
1-1/4 x 8	1043837	21000	750.00	1.25	2.50	5.00	1.25	4.00	8.00	13.38	2.88
1-1/4 x 12	1043855	21000	900.00	1.25	2.50	5.00	1.25	4.00	12.00	17.38	2.88
1-1/4 x 20	1043873	21000	1210.00	1.25	2.50	5.00	1.25	6.00	20.00	25.38	2.88

*Ultimate Load is 5 times Working Load Limit.

SHOULDER NUT EYE BOLTS





G-277

SEE APPLICATION AND WARNING INFORMATION

- Forged Steel
- Hot Dip galvanized
- Furnished with standard Hot Dip galvanized, heavy hex nuts

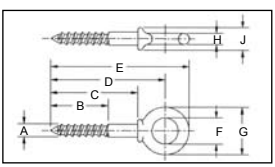
SHANK DIAMETER & LENGTH (IN.)	G-277 STOCK NO. GALV.	WORKING LOAD LIMIT* (LBS.)	WEIGHT PER 100 (LBS.)	DIMENSIONS (IN)								
				A	B	C	D	E	F	G	H	J
1/4 x 2	1045014	650	6.60	.25	.50	.88	.19	1.50	2.00	2.94	.50	.47
1/4 x 4	1045032	650	9.10	.25	.50	.88	.19	2.50	4.00	4.94	.50	.47
5/16 x 2-1/4	1045050	1200	12.50	.31	.62	1.12	.25	1.50	2.25	3.50	.69	.56
5/16 x 4-1/4	1045078	1200	18.80	.31	.62	1.12	.25	2.50	4.25	5.50	.69	.56
3/8 x 2-1/2	1045096	1550	21.40	.38	.75	1.38	.31	1.50	2.50	3.97	.78	.66
3/8 x 4-1/2	1045112	1550	25.30	.38	.75	1.38	.31	2.50	4.50	5.97	.78	.66
1/2 x 3-1/4	1045130	2600	42.60	.50	1.00	1.75	.38	1.50	3.25	5.12	1.00	.91
1/2 x 6	1045158	2600	56.60	.50	1.00	1.75	.38	3.00	6.00	7.88	1.00	.91
5/8 x 4	1045176	5200	68.60	.62	1.25	2.25	.50	2.00	4.00	6.44	1.31	1.12
5/8 x 6	1045194	5200	102.40	.62	1.25	2.25	.50	3.00	6.00	8.44	1.31	1.12
3/4 x 4-1/2	1045210	7200	144.50	.75	1.50	2.75	.62	2.00	4.50	7.44	1.56	1.38
3/4 x 6	1045238	7200	167.50	.75	1.50	2.75	.62	3.00	6.00	8.94	1.56	1.38
7/8 x 5	1045256	10600	225.00	.88	1.75	3.25	.75	2.50	5.00	8.47	1.84	1.56
1 x 6	1045292	13300	366.60	1.00	2.00	3.75	.88	3.00	6.00	9.97	2.09	1.81
1 x 9	1045318	13300	422.50	1.00	2.00	3.75	.88	4.00	9.00	12.97	2.09	1.81
1-1/4 x 8	1045336	21000	650.00	1.25	2.50	4.50	1.00	4.00	8.00	12.72	2.47	2.28
1-1/4 x 12	1045354	21000	795.00	1.25	2.50	4.50	1.00	4.00	12.00	16.72	2.47	2.28
1-1/2 x 15	1045372	24000	1425.00	1.50	3.00	5.50	1.25	6.00	15.00	20.75	3.00	2.75

*Ultimate Load is 5 times Working Load Limit.

SCREW EYE BOLTS

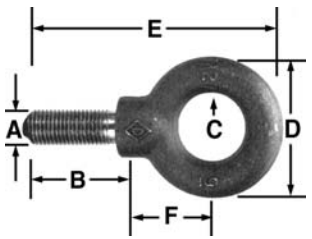
- Forged Steel – Quenched and Tempered
- Hot Dip galvanized

G-275



SHANK DIAMETER & LENGTH (IN.)	G-275 STOCK NO. GALV.	WORKING LOAD LIMIT* (LBS.)	WEIGHT PER 100 (LBS.)	DIMENSIONS (IN)								
				A	B	C	D	E	F	G	H	J
1/4 x 2	1046111	500	4.30	.25	1.50	2.00	2.50	2.94	.50	.88	.19	.47
5/16 x 2-1/4	1046139	800	12.50	.31	1.69	2.25	2.94	3.50	.63	1.13	.25	.56
3/8 x 2-1/2	1046157	1200	19.00	.38	1.88	2.50	3.28	3.97	.75	1.38	.31	.66
1/2 x 3-1/4	1046175	2200	37.50	.50	2.44	3.25	4.25	5.12	1.00	1.75	.38	.91
5/8 x 4	1046193	3500	75.00	.62	3.00	4.00	5.31	6.44	1.25	2.25	.50	1.12

SHOULDER TYPE MACHINE EYE BOLTS



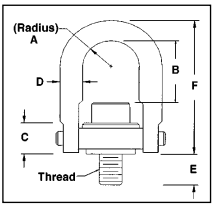
- Forged
- 1030 Carbon Steel
- Self-Colored

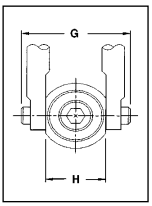
SEE APPLICATION AND WARNING INFORMATION

STOCK NO.	THREAD SIZE UNC-2A A	SHANK LENGTH B	I.D. EYE C	O.D. EYE D	OVERALL LENGTH E	CENTER OF EYE TO SHOULDER F	BLANKS*	APPROX. WT. PER 100 PCS. (LBS.)	RATED CAP. (LBS.)
14611	1/4 - 20	1	3/4	1-3/16	2-3/8	3/4	R14611	5.0	500
14621	5/16 - 18	1-1/8	7/8	1-7/16	2-13/16	15/16	R14621	9.6	900
14631	3/8 - 16	1-1/4	1	1-11/16	3-1/4	1-1/8	R14631	16.0	1,300
14638	7/16 - 14	1-3/8	1-3/32	1-13/16	3-9/16	1-1/4	R14638	24.2	1,800
14641	1/2 - 13	1-1/2	1-3/16	2-1/8	3-31/32	1-3/8	R14641	34.8	2,400
14650	9/16 - 12	1-3/4	1-3/8	2-9/16	4-3/4	1-21/32	R14650	47.0	3,200
14661	5/8 - 11	1-3/4	1-3/8	2-9/16	4-3/4	1-21/32	R14661	67.0	4,000
14672	3/4 - 10	2	1-1/2	2-13/16	5-1/4	1-13/16	R14682	100.0	5,000
14682	7/8 - 9	2-1/4	1-11/16	3-3/16	6	2-1/8	R14682	163.0	7,000
14702	1 - 8	2-1/2	1-13/16	3-9/16	6-5/8	2-5/16	R14702	222.0	9,000
14712	1-1/8 - 7	2-3/4	2	4-1/16	7-17/32	2-11/16	R14712	340.0	12,000
14723	1-1/4 - 7	3	2-13/16	4-7/16	8-7/32	2-15/16	R14723	444.0	15,000
14753	1-1/2 - 6	3-1/2	2-1/2	5-3/16	9-15/32	3-5/16	R14753	736.0	21,000
14770	1-3/4 - 5	3-3/4	2-7/8	6	10-13/16	4	R14770	1135.0	28,000
14780	2 - 4-1/2	4	3-1/4	6-7/8	11-7/8	4-3/8	R14780	1670.0	38,000

*Blanks have no rated capacity.

ACTEK™ SWIVEL (SAFETY) HOIST RINGS
UNC THREADS





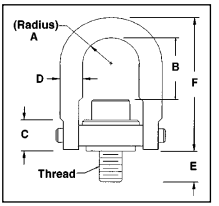
- Rated load from 400 lbs. to 125 tons.
- Pivots 180°/Swivels 360°
- Material: AISI 4140 aircraft quality
- Finish: Black oxide per mil spec cadmium plated
- Safety factor: 5:1
- 100% magnetic particle inspected
- Certified heat treatment

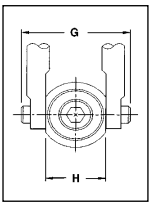
UNC THREADS

METRIC THREADS
See following page

RATED LOADS (LBS.)	THREAD SIZE (IN.)	A	C	D	E	STANDARD U-BAR PART NO.	STANDARD U-BAR B	STANDARD U-BAR F	LONG U-BAR PART NO.	LONG U-BAR B	LONG U-BAR F	G	H	TORQUE (FT/LB)	WT. (LBS)
600	1/4 - 20	0.43	0.71	3/8	0.54	46100	1.27	2.67	–	–	–	1.84	1.00	6	0.3
800	5/16 - 18	0.43	0.71	3/8	0.29	46102	1.27	2.67	–	–	–	1.84	1.00	7	0.3
800	5/16 - 18	0.43	0.71	3/8	0.54	46104	1.27	2.67	–	–	–	1.84	1.00	7	0.3
1,000	3/8 - 16	0.43	1.71	3/8	0.54	46106	1.27	2.67	–	–	–	1.84	1.00	12	0.3
2,000	7/16 - 14	0.70	0.93	1/2	1.07	46606	1.84	3.77	–	–	–	2.58	1.49	22	1.0
2,500	1/2 - 13	0.70	0.93	1/2	1.07	46602	1.84	3.77	–	–	–	2.58	1.49	28	1.0
2,000	7/16 - 14	0.88	1.22	3/4	0.78	46000	2.31	4.78	46638	4.25	6.72	3.52	1.99	22	2.6
2,500	1/2 - 13	0.88	1.22	3/4	0.78	46008	2.31	4.78	46644	4.25	6.72	3.52	1.99	28	2.6
2,500	1/2 - 13	0.88	1.22	3/4	1.03	46010	2.31	4.78	46646	4.25	6.72	3.52	1.99	28	2.6
2,500	1/2 - 13	0.88	1.22	3/4	1.28	46012	2.31	4.78	46648	4.25	6.72	3.52	1.99	28	2.6
4,000	5/8 - 11	0.88	1.22	3/4	0.78	46002	2.18	4.78	–	–	–	3.52	1.99	60	2.6
4,000	5/8 - 11	0.88	1.22	3/4	1.03	46004	2.18	4.78	46640	4.12	6.72	3.52	1.99	60	2.6
4,000	5/8 - 11	0.88	1.22	3/4	1.28	46006	2.18	4.78	46642	4.12	6.72	3.52	1.99	60	2.6
5,000	3/4 - 10	0.88	1.22	3/4	1.03	46014	2.06	4.78	46650	4.00	6.72	3.52	1.99	100	3.0
5,000	3/4 - 10	0.88	1.22	3/4	1.53	46018	2.06	4.78	46654	4.00	6.72	3.52	1.99	100	3.0
7,000	3/4 - 10	1.40	1.71	1	1.04	46204	3.06	6.52	46658	4.65	8.11	5.14	3.00	100	7.0
7,000	3/4 - 10	1.40	1.71	1	2.54	46206	3.06	6.52	46660	4.65	8.11	5.14	3.00	100	7.0
8,000	7/8 - 9	1.40	1.71	1	1.04	46202	2.93	6.52	46656	4.52	8.11	5.14	3.00	160	7.0
8,000	7/8 - 9	1.40	1.71	1	1.29	46203	2.93	6.52	46652	4.52	8.11	5.14	3.00	160	7.0
10,000	1 - 8	1.40	1.71	1	1.29	46210	2.81	6.52	46662	4.40	8.11	5.14	3.00	230	7.5
10,000	1 - 8	1.40	1.71	1	1.54	46212	2.81	6.52	46664	4.40	8.11	5.14	3.00	230	7.5
10,000	1 - 8	1.40	1.71	1	2.29	46214	2.81	6.52	46666	4.40	8.11	5.14	3.00	230	7.5
15,000	1-1/4 - 7	1.75	2.11	1-1/4	1.89	46802	4.12	8.73	–	–	–	6.50	3.76	470	14.0
20,000	1-3/8 - 6	2.00	2.36	1-1/2	2.64	46702	5.20	10.59	–	–	–	7.46	4.31	540	22.0
24,000	1-1/2 - 6	2.25	2.81	1-3/4	2.70	46404	6.41	12.47	–	–	–	8.55	4.87	800	34.0
24,000	1-3/4 - 5	2.25	2.81	1-3/4	2.70	46408	6.41	12.47	–	–	–	8.55	4.87	800	34.0
30,000	2 - 4-1/2	2.25	2.81	1-3/4	2.96	46400	5.91	12.47	–	–	–	8.55	4.87	800	36.0
50,000	2-1/2 - 8	3.00	4.09	2-1/4	4.00	47002	8.03	16.87	–	–	–	11.67	6.52	2100	88.0
50,000	2-1/2 - 4	3.00	4.09	2-1/4	4.00	47006	8.03	16.87	–	–	–	11.67	6.52	2100	88.0
75,000	3 - 4	3.75	5.27	2-3/4	4.20	47200	8.48	19.50	–	–	–	14.15	8.10	4300	166.0
100,000	3-1/2 - 4	4.00	6.06	3-1/4	7.00	47402	9.28	22.09	–	–	–	15.90	8.60	5100	265.0
250,000	6 - 4	6.00	14.00	5	9.00	47602	14.00	33.00	–	–	–	25.00	13.00	9900	790.0

ACTEK™ SWIVEL (SAFETY) HOIST RINGS
METRIC THREADS





- Rated load from 400 lbs. to 125 tons.
- Pivots 180°/Swivels 360°
- Material: AISI 4140 aircraft quality
- Finish: Black oxide per mil spec cadmium plated
- Safety factor: 5:1
- 100% magnetic particle inspected
- Certified heat treatment

METRIC THREADS

UNC THREADS
See previous page

RATED LOADS (KGS.)	THREAD SIZE	A	C	D	E	STANDARD U-BAR PART NO.	STANDARD U-BAR B	STANDARD U-BAR F	LONG U-BAR PART NO.	LONG U-BAR B	LONG U-BAR F	G	H	TORQUE (KGM.)	WT. (KGS.)
400	M8 x 1.25	11	18	10	13	46912	32	68	–	–	–	47	25	0.86	0.17
500	M10 x 1.50	11	18	10	18	46916	30	68	–	–	–	47	25	1.5	0.17
1,050	M12 x 1.75	22	30	19	19	46924	60	121	47124	110	171	89	51	3.7	1.08
1,900	M16 x 2.00	22	30	19	29	46930	56	121	47130	106	171	89	51	8.4	1.12
2,150	M20 x 2.50	22	30	19	34	46936	52	121	47136	102	171	89	51	14	1.19
3,000	M20 x 2.50	36	43	25	32	46942	78	166	47142	118	206	131	76	14	3.03
4,200	M24 x 3.00	36	43	25	37	46948	74	166	47148	114	206	131	76	14	3.10
4,200	M30 x 3.50	36	43	25	58	–	–	–	46950	108	206	131	76	60	3.10
7,000	M30 x 3.50	45	54	32	42	46956	106	222	–	–	–	165	95	60	6.30
7,000	M30 x 3.50	45	54	32	62	46958	106	222	–	–	–	165	95	60	6.40
11,000	M36 x 4.00	57	71	44	64	46966	166	317	–	–	–	217	124	100	15.50
12,500	M42 x 4.50	57	71	44	82	46968	160	317	–	–	–	217	124	100	16.00
13,500	M48 x 5.00	57	71	44	82	46970	154	317	–	–	–	217	124	100	16.80
22,300	M64 x 6.00	76	103	57	101	46972	204	428	–	–	–	296	165	273	39.00
31,500	M72 x 6.00	95	133	70	132	46988	220	495	–	–	–	359	206	559	74.00
51,000	M90 x 6.00	102	153	83	177	46990	235	561	–	–	–	404	218	663	118.00

IPUZ / UNIVERSAL VERTICAL LIFTING CLAMP

IPUZ vertical lifting clamps are used for lifting, turning (180°) and vertical transfer of steel plates & constructions.

- Hinged hoisting eye allows the user to place and lift the load from virtually any direction.
- All IPUZ clamps have latches that lock in both the open and closed positions.
- IPUZ clamps with working load limits greater than 12 tons have special built-in hook-up devices to assist in the placement of these large-sized clamps.

MODEL	ORDER NO.	WLL PER PCE. (TONS)	JAW OPENING (IN.)	WT. PER PIECE (LBS.)
0,75 - IPUZ	5051	0,75	0 - 5/8	4
0,75 - IPSUZ	5052	0,75	5/8 - 1-1/4	4
0,75 - IPWGUNZ	1601	0,75	0 - 3/4	4
1,5 - IPUZ	5053	1,5	0 - 3/4	17
1,5 - IPSUZ	5054	1,5	3/4 - 1-5/8	17
1,5 - IPWGUZ	5186	1,5	0 - 1-3/8	17
3 - IPUZ	5055	3,0	0 - 1	35
3 - IPSUZ	5056	3,0	1 - 2	36
4,5 - IPUZ	5057	4,5	0 - 1	35
4,5 - IPSUZ	5058	4,5	1 - 2	37
6 - IPUNZ	5139	6,0	0 - 1-1/4	50
6 - IPSUNZ	5140	6,0	1-1/4 - 2-1/2	51
9 - IPUNZ	5141	9,0	0 - 1-5/8	63
9 - IPSUNZ	5142	9,0	1-5/8 - 3-1/8	64
12 - IPUNZ	5078	12,0	0 - 2-1/8	126
12 - IPSUNZ	5079	12,0	2-1/8 - 4-1/4	130
16 - IPUNZ	5093	16,0	1/4 - 2-1/2	174
16 - IPSUNZ	5094	16,0	2-1/2 - 5	203
22,5 - IPUNZ	5098	22,5	1/4 - 3-1/8	281
22,5 - IPSUNZ	5099	22,5	3-1/8 - 6-1/8	288
30 - IPUNZ	5112	30,0	1/4 - 3-1/8	337
30 - IPSUNZ	5113	30,0	3-1/8 - 6-1/8	364

Type IPURZ has a cam segment and pivot made of stainless steel.

IPHGZ / IPHGUZ HORIZONTAL LIFTING CLAMP

IPHGZ horizontal lifting clamps are designed for the lifting and transfer in the horizontal position of steel plates, including thin plates that sag.

IPHGZ

- Clamps have a latch which allows the oprator to position the clamp and move away from the load before the lift begins.
- Suitable for working in conjunction with an angle bench, guillotine, round roller, etc.

MODEL	ORDER NO.	WLL PER PCE. (TONS)	JAW OPENING (IN.)	WT. PER PIECE (LBS.)
0,75 - IPHGZ	5451	0,75	0 - 1	8
1,5 - IPHGZ	5452	1,5	0 - 1	16
3 - IPHGZ	5453	3,0	0 - 1-1/2	27
4,5 - IPHGZ	5454	4,5	0 - 1-1/2	46
4,5 - IPHGX_1Z	3772	4,5	1/4 - 1-3/4	50
1,5 - IPHGUZ	5455	1,5	0 - 1	18

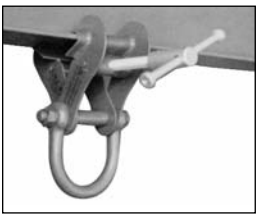
Type IPHGZ has a fixed hoisting eye.
Type IPHGUZ has a universal hoisting eye.

FIXED JAW ADJUSTABLE GIRDER CLAMPS

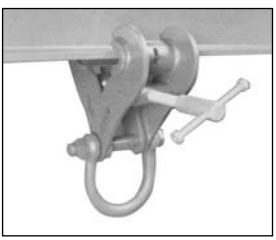
These Fixed Jaw Adjustable Girder Clamps are truly versatile in application and may be used for lifting, pulling or as an anchor point.

- Designed specifically to provide maximum JAW GRIP ADJUSTMENT.
- Engineered for practical use where mobility is essential.
- Easily applied and do not require additional tools or width adjusting components such as spacing washers.

MODEL	WLL@ 0 - 15° VERT. (LBS.)	JAW GRIP ADJ. MIN-MAX (IN.)	JAW APERTURE (IN.)	INSIDE SHACKLE CROWN TO SPACER (IN.)	AVG. WT. (LBS.)
S1	4480	3 - 7-1/2	7/8	3-3/4	8.8
S2	6720	3 - 7-1/2	7/8	3-3/4	11.3
S2A	6720	3 - 7-1/2	7/8	3-3/4	16.3
S3	8960	6 - 10	7/8	3-9/10	22.9
S3X	11200	3 - 7-1/2	7/8	4-1/8	19.9
S3A	11200	6 - 12	1-5/8	4-1/8	32.8
S4S	13440	8 - 18	1-5/8	4-1/8	41.5
S4A	22400	8 - 18	1-5/8	5-1/8	60.2
S12	33600	8 - 18	2	5-7/8	118.4
S14	33600	16 - 24	2-1/2	5-7/8	126.1



SWIVEL JAW ADJUSTABLE GIRDER CLAMPS



Swivel Jaw Adjustable Girder Clamps incorporate the additional benefit of horizontal jaw adjustment. This enables the full length and maximum width of the swivel jaw to anchor evenly on a considerable surface area of the beam flange. Additional tools or width adjusting components are not required.

MODEL	WLL@ 0 - 15° VERT. (LBS.)	JAW GRIP ADJ. MIN-MAX (IN.)	JAW APERTURE (IN.)	INSIDE SHACKLE CROWN TO SPACER (IN.)	AVG. WT. (LBS.)
S5	6720	3-1/2 - 12	1	3-3/4	22.0
S5A	6720	3-1/2 - 12	1	4-1/8	30.4
S6	11200	3-1/2 - 12	1	4-1/8	30.4
S6A	11200	3-1/2 - 12	1	4-1/8	33.5
S11	22400	3-1/2 - 12	1	5-1/8	45.4

ADJUSTABLE RUNWAY BEAM TROLLEYS

"SUPERCLAMP" Adjustable Runway Beam Trolleys are of acknowledged and experienced design. The unique quality features of this new range of manual travelling gear are the Wheelguarding Anti-drop Plates, which are incorporated into the practical design of these transferable and mobile securing attachments. To complement this range, reference is made to "SUPERCLAMP" Geared Runway Beam Trolleys which allow additional ease of load conveyance.

MODEL	WLL@ 0° VERT. (LBS.)	WIDTH ADJ. MIN-MAX (IN.)	TO ACCOM-MODATE BEAM FLANGE MAX. THKNS. (IN.)	INSIDE SHACKLE CROWN TO SPACER (IN.)	AVG. WT. (LBS.)
B1	6720	3 - 8	1-1/8	4	60.6
B2	13440	4 - 12	1-1/4	4	107.2
B3	22400	4 - 12	1-1/2	5-1/8	158.7

SWIVELS

TIMKEN BEARING EQUIPPED
LOAD RATED

S-1
JAW & HOOK

SAFE WORKING LOAD*	TYPE	SWIVEL NUMBER	WIRE ROPE SIZE	WEIGHT EACH (LBS.)
3	S - 1	3 - S - 1	1/2	9.81
3	S - 2	3 - S - 2	1/2	9.63
3	S - 3	3 - S - 3	1/2	9.12
3	S - 4	3 - S - 4	1/2	9.00
3	S - 5	3 - S - 5	1/2	8.50
3	S - 6	3 - S - 6	1/2	9.32
5	S - 1	5 - S - 1	5/8	15.51
5	S - 2	5 - S - 2	5/8	13.69
5	S - 3	5 - S - 3	5/8	13.50
5	S - 4	5 - S - 4	5/8	12.33
5	S - 5	5 - S - 5	5/8	11.30
5	S - 6	5 - S - 6	5/8	14.24
8-1/2	S - 1	8-1/2 - S - 1	3/4	29.42
8-1/2	S - 2	8-1/2 - S - 2	3/4	26.16
8-1/2	S - 3	8-1/2 - S - 3	3/4	24.90
8-1/2	S - 4	8-1/2 - S - 4	3/4	29.00
8-1/2	S - 5	8-1/2 - S - 5	3/4	29.25
8-1/2	S - 6	8-1/2 - S - 6	3/4	32.00
10	S - 1	10 - S - 1	7/8	46.75
10	S - 2	10 - S - 2	7/8	45.75
10	S - 3	10 - S - 3	7/8	43.50
10	S - 4	10 - S - 4	7/8	44.00
10	S - 5	10 - S - 5	7/8	42.00
10	S - 6	10 - S - 6	7/8	45.50
15	S - 1	15 - S - 1	1	73.75
15	S - 2	15 - S - 2	1	62.75
15	S - 3	15 - S - 3	1	61.00
15	S - 4	15 - S - 4	1	61.00
15	S - 5	15 - S - 5	1	49.00
15	S - 6	15 - S - 6	1	63.00
25	S - 1	25 - S - 1	–	140.00
25	S - 2	25 - S - 2	–	140.00
25	S - 3	25 - S - 3	–	135.00
25	S - 4	25 - S - 4	–	135.00
25	S - 5	25 - S - 5	–	130.00
25	S - 6	25 - S - 6	–	135.00
35	S - 1	35 - S - 1	–	220.00
35	S - 2	35 - S - 2	–	155.00
35	S - 3	35 - S - 3	–	150.00
35	S - 4	35 - S - 4	–	150.00
35	S - 5	35 - S - 5	–	145.00
35	S - 6	35 - S - 6	–	215.00
45	S - 1	45 - S - 1	–	251.00
45	S - 2	45 - S - 2	–	235.00
45	S - 3	45 - S - 3	–	225.00
45	S - 4	45 - S - 4	–	225.00
45	S - 5	45 - S - 5	–	215.00
45	S - 6	45 - S - 6	–	270.00

*Safe working load in metric tons.

S-2
JAW & JAW

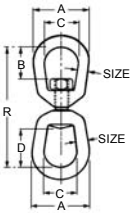
S-3
JAW & EYE

S-4
EYE & JAW

S-5
EYE & EYE

S-6
EYE & HOOK

REGULAR



SIZE (IN.)	SAFE WORKING LOAD (LBS)*	DIMENSIONS (IN)					WEIGHT EACH (LBS.)
		A	B	C	D	R	
1/4	850	1-1/4	11/16	3/4	1-1/16	2-15/16	.21
5/16	1250	1-5/8	13/16	1	1-1/4	3-9/16	.39
3/8	2250	2	15/16	1-1/4	1-1/2	4-5/16	.71
1/2	3600	2-1/2	1-5/16	1-1/2	2	5-7/16	1.32
5/8	5200	3	1-9/16	1-3/4	2-3/8	6-9/16	2.49
3/4	7200	3-1/2	1-3/4	2	2-5/8	7-3/16	4.02
7/8	10000	4	2-1/16	2-1/4	3-1/16	8-3/8	6.25
1	12500	4-1/2	2-5/16	2-1/2	3-1/2	9-5/8	8.95
1-1/4	18000	5-5/8	2-11/16	3-1/8	2-11/16	11-1/8	16.37
1-1/2	45200	7	4-3/16	4	4-3/16	17-1/8	45.79

*Ultimate Load is five times the Safe Working Load.

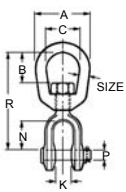
G-402
REGULAR QUENCHED & TEMPERED

JAW END

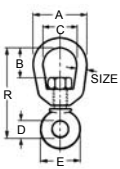
G-403
JAW END QUENCHED & TEMPERED

SIZE (IN.)	SAFE WORKING LOAD (LBS)*	DIMENSIONS (IN)							WEIGHT EACH (LBS.
		A	B	C	K	N	P	R	
1/4	850	1-1/4	11/16	3/4	15/32	7/8	1/4	2-5/8	.21
5/16	1250	1-5/8	13/16	1	1/2	7/8	5/16	2-15/16	.34
3/8	2250	2	15/16	1-1/4	5/8	1-1/16	3/8	3-5/8	.66
1/2	3600	2-1/2	1-5/16	1-1/2	3/4	1-5/16	1/2	4-1/2	1.34
5/8	5200	3	1-9/16	1-3/4	15/16	1-1/2	5/8	5-5/16	2.48
3/4	7200	3-1/2	1-3/4	2	1-1/8	1-3/4	3/4	6-1/16	3.88
7/8	10000	4	2-1/16	2-1/4	1-3/16	2-1/16	7/8	7	5.87
1	12500	4-1/2	2-5/16	2-1/2	1-3/4	2-13/16	1-1/8	8-9/16	9.84
1-1/4	18000	5-5/8	2-11/16	3-1/8	2-1/16	2-13/16	1-3/8	9-7/16	15.75
1-1/2	45200	7	4-3/16	4	2-7/8	4-7/16	2-1/4	14-3/4	54.75

*Ultimate Load is five times the Safe Working Load.



CHAIN



SIZE (IN.)	SAFE WORKING LOAD (LBS)*	DIMENSIONS (IN)						WEIGHT EACH (LBS.)
		A	B	C	D	E	R	
1/4	850	1-1/4	11/16	3/4	7/16	15/16	2-1/4	.13
5/16	1250	1-5/8	13/16	1	1/2	1-1/8	2-23/32	.25
3/8	2250	2	15/16	1-1/4	3/4	1-1/2	3-7/16	.54
1/2	3600	2-1/2	1-5/16	1-1/2	7/8	1-7/8	4-1/4	1.12
5/8	5200	3	1-9/16	1-3/4	1-1/16	2-3/16	5-1/8	2.09
3/4	7200	3-1/2	1-3/4	2	1-1/4	2-5/8	5-25/32	3.09

*Ultimate Load is five times the Safe Working Load.

G-401
CHAIN QUENCHED & TEMPERED

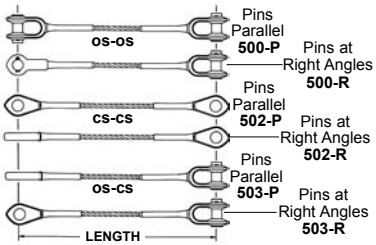
SWAGED SOCKETS ASSEMBLIES

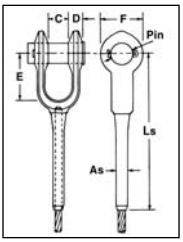
In mechanically swaged fittings, high pressure presses and precision dies cause metal of the socket to flow around wires and strands to offer the ultimate in compactness and strength with minimum weight. Material is weldless, drop-forged steel.

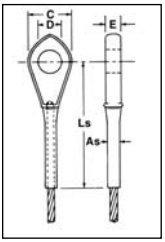
Normally, only regular lay rope is used. Swaged assemblies are interchangeable with *poured sockets up through 2" rope diameters. Assembly length is measured from centerline of pins for both open and closed sockets.

When purchasing, indicate choice of end fittings by the suffixes “OS” or “CS” after the stock number, for open or closed type fittings. Pins and cotters are supplied as standard on open fittings, but assemblies may be specified without pins. Fittings are assembled in the same plane unless specified otherwise when ordered.

* These sockets are not interchangeable with zinc poured sockets.







ROPE DIA.	OPEN SOCKET DIAMETER (IN)							CLOSED SOCKET DIAMETER (IN)				
	C	D	E	F	PIN	A_S	L_S (APPROX.)	C	D	E	A_S	L_S (APPROX.)
1/4	11/16	5/16	1-1/2	1-3/8	.688	.438	4-7/16	1-7/16	.750	1/2	.438	3-15/16
5/16	13/16	13/32	1-3/4	1-5/8	.812	.688	5-15/16	1-11/16	.875	11/16	.688	5-1/8
3/8	13/16	13/32	1-3/4	1-5/8	.812	.688	5-15/16	1-11/16	.875	11/16	.688	5-1/8
7/16	1	1/2	2	2	1.00	.875	7-5/8	2	1.063	7/8	.875	6-5/8
1/2	1	1/2	2	2	1.00	.875	7-5/8	2	1.063	7/8	.875	6-5/8
9/16	1-1/4	5/8	2-1/4	2-1/2	1.19	1.125	9-3/16	2-1/2	1.250	1-1/8	1.125	8-5/16
5/8	1-1/4	5/8	2-1/4	2-1/2	1.19	1.125	9-3/16	2-1/2	1.250	1-1/8	1.125	8-5/16
3/4	1-1/2	3/4	2-3/4	3	1.38	1.375	11-1/4	3	1.438	1-5/16	1.375	9-15/16
7/8	1-3/4	15/16	3-1/4	3-3/8	1.63	1.50	13-1/8	3-1/2	1.688	1-1/2	1.50	11-5/8
1	2	1-1/32	3-3/4	4	2.00	1.75	15-1/16	4	2.063	1-3/4	1.75	13-3/16
1-1/8	2-1/4	1-3/16	4-1/4	4-1/2	2.25	2.00	16-15/16	4-1/2	2.313	2	2.00	14-11/16
1-1/4	2-1/2	1-3/16	4-3/4	5	2.50	2.25	18-5/8	5	2.563	2-1/4	2.25	16-1/2
1-3/8	2-1/2	1-5/16	5-1/4	5-1/4	2.50	2.50	20-1/2	5-1/4	2.563	2-1/4	2.50	18-1/8
1-1/2	3	1-7/16	5-3/4	5-3/4	2.75	2.75	22-5/16	5-1/2	2.813	2-1/2	2.75	19-9/16
1-3/4	3-1/2	1-11/16	6-3/4	7	3.50	3.00	26	6-3/4	3.563	3	3.00	23
2	4	1-13/16	8	8	3.75	3.50	30-1/8	7-3/4	3.813	3-1/4	3.50	26-7/16
2-1/4*	4-1/4	2-1/8	6-3/4	8-3/4	4.25	4.00	31-1/4	8-3/4	4.312	4	4.00	28-1/2
2-1/2*	4-1/4	2-1/8	6-3/4	8-3/4	4.25	4.40	33-3/8	8-3/4	4.312	4	4.40	30-1/4

ROPE DIA.	CAPACITY (TONS*) 6X19 & 6X37 IWRC	
	LPS	XIP
1/4	.588	.69
5/16	.916	1.05
3/8	1.3	1.5
7/16	1.778	2.04
1/2	2.3	2.66
9/16	2.9	3.36
5/8	3.58	4.12
3/4	5.12	5.88
7/8	6.92	7.96
1	8.98	10.34
1-1/8	11.3	13.
1-1/4	13.88	15.98
1-3/8	16.7	19.2
1-1/2	19.78	22.8
1-3/4	26.6	30.6
2	34.4	39.6
2-1/4	43.	49.4
2-1/2	52.4	60.4

NEW IMPROVED LIGHT CHAMPION by McKissick®

418
w/Hook

419
w/Shackle

404
Tail Board

- Forged alloy heat treated hooks.
- Forged steel swivel tees, yokes and shackles.
- Hook and shackle assemblies on 4-1/2" through 14" sizes can be interchanged.
- Can be furnished with bronze bushings or roller bearings.
- Opening feature permits insertion of rope while block is suspended from gin-pole.
- 3" thru 18" 418 and 419 blocks have exclusive bolt retaining spring to assure no lost bolts.
- Can be furnished with SS-4055 hook latch.
- Pressure lube fittings.
- Fatigue rated.
- 3" - 10" feature dual rated wireline sheaves.

SHEAVE DIA. (IN.)	BEARING CODE	STOCK NO. 481 WITH HOOK	STOCK NO. 419 WITH SHACKLE	STOCK NO. 404 TAIL BOARD	WIRE ROPE SIZE (IN.)‡	WORKING LOAD LIMIT* (TONS)	WEIGHT EACH (LBS.) 418 WITH HOOK	WEIGHT EACH (LBS.) 419 WITH SHACKLE	WEIGHT EACH (LBS.) 404 TAIL BOARD	REPLACEMENT SHEAVE STOCK NO.
3**	BB	–	109091	–	5/16 - 3/8	2	–	5	–	460147
3**	BB	108038	109037†	102016	5/16 - 3/8	2	5	4	3	460147
4-1/2**	BB	108065	109064	102025	3/8 - 1/2	4	12	12	7	2000232
6	BB	108127	109126	102098	5/8 - 3/4	8	27	28	15	460815
6	RB	108154	109153	102114	5/8 - 3/4	8	27	28	15	472688
8	BB	108225	109224	102169	5/8 - 3/4	8	33	34	21	461164
8	RB	108252	109251	102187	5/8 - 3/4	8	33	34	21	473277
10	BB	108323	109322	102230	5/8 - 3/4	8	41	42	29	461805
10	RB	108350	109359	102258	5/8 - 3/4	8	41	42	29	473776
12	BB	169169	202961	178890	5/8	8	48	49	36	462270
12	RB	199911	169347	178934	5/8	8	48	49	36	474141
12	BB	108421	109420	102301	3/4	8	48	49	36	462289
12	RB	108458	109457	102329	3/4	8	48	49	36	474150
14	BB	194920	169356	–	5/8	8	55	56	–	463625
14	RB	199948	167857	–	5/8	8	55	56	–	474766
14	BB	108528	109527	–	3/4	8	55	56	–	463634
14	RB	108546	109545	–	3/4	8	55	56	–	474775
16	BB	199975	203041	–	3/4	15	130	135	–	4100056
16	RB	200008	203087	–	3/4	15	130	135	–	4200028
16	BB	108608	109607	–	7/8	15	130	135	–	4100065
16	RB	108626	109625	–	7/8	15	130	135	–	4200037
18	BB	200099	203130	–	7/8	15	150	155	–	464571
18	RB	200151	203176	–	7/8	15	150	155	–	475792
18	BB	108644	109643	–	1	15	150	155	–	4104640
18	RB	108662	109661	–	1	15	150	155	–	6000000

*Ultimate Load is 4 times the Working Load Limit.
**Available in Bronze Bushed only. 3" and 4-1/2" have self-lubricating Bronze Bushing.
†Fitted with 1-1/4" ID Swivel Eye.
‡May be furnished in other rope sizes.

ROTATION RESISTANT WIRE ROPES

In certain instances the use of rotation resistant wire rope is necessary to provide rotational stability to the lifted load. In general, the use of these specialized wire ropes is limited to those situations where it is impractical to:

1. Use a tag line.
2. Relocate rope dead end.
3. Increase sheave sizes.
4. Eliminate "odd-part" reeving.
5. Significantly reduce rope loading and rope length.

Rotation resistant wire ropes have less of a tendency to unlay when loaded than do conventional wire ropes. This results in improved rotational stability to the lifted load within a safe working load range. Rotation resistant wire ropes are designed in such a way that the rotational force of the outer rope is partially counteracted by the rotational force of the inner rope when the rope is subjected to a load.

The rated strengths of rotation resistant ropes are less than the conventional 6 x 19 and 6 x 36 Classification wire ropes, and larger sheaves and drums are required in order to achieve comparable fatigue life. Drum and sheave diameters should be 34 to 36 times rope diameter for the 19 x 7 and 35 x 7 rotation resistant ropes and 21 to 27 times rope diameter for 8 x 19 rotation resistant ropes.

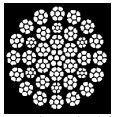
Rotation Resistant Ropes are available in a full range of sizes, grades and constructions:

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

NOTE:

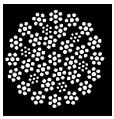
1. Swivels are not recommended for use with rotation resistant ropes.
2. Although B30 standards permit rotation resistant ropes to be used under certain conditions at design factors of 3.5:1, we recommend a minimum design factor of 5:1 and a design factor of 7:1 for extended rope life.

Dyform® - 34LR



Strongest, most rotation resistant. For the most demanding hoisting applications.

35LS

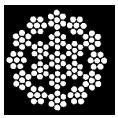


For demanding applications where highest strength is not mandatory.

DYFORM®-34LR & 35LS ROTATION RESISTANCE ROPE

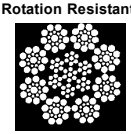
DIAMETER		MIN. BREAKING FORCE** (TONS) 1960		MIN. BREAKING FORCE** (TONS) 2160	APPROX. WT/FT (LBS)	
(MM)	(IN.)	34LR	35LS	34LR	34LR	35LS
–	1/2	15.40	13.60	17.42	.54	.49
13	–	16.19	14.28	18.21	.57	.51
14	–	18.88	16.52	21.13	.65	.60
–	9/16	19.67	17.31	22.03	.69	.62
15	–	22.03	19.11	24.73	.77	.69
16	5/8	25.18	21.69	28.21	.87	.78
17	–	27.20	24.28	30.46	.94	.87
18	–	30.80	27.09	34.62	1.07	..97
19	3/4	34.51	30.91	38.67	1.20	1.11
20	–	38.33	33.61	42.94	1.32	1.21
21	–	43.28	37.43	48.45	1.49	1.34
22	–	46.65	41.37	52.38	1.61	1.49
–	7/8	47.21	41.59	53.06	1.65	1.51
23	–	50.69	44.74	56.88	1.75	1.61
24	–	55.64	49.35	62.38	1.92	1.77
25	–	60.59	52.94	67.89	2.10	1.91
–	1	62.38	54.40	70.03	2.16	1.97
26	–	66.09	57.78	74.19	2.28	2.08
28	–	75.99	66.99	85.20	2.63	2.41
–	1-1/8	77.45	68.90	86.89	2.70	2.50
30	–	86.44	75.99	97.01	2.99	2.74
32	1-1/4	98.13	85.99	110.16	3.39	3.10
35	1-3/8	116.90	105.89	123.65	4.05	3.82
38	1-1/2	138.26	120.27	147.25	4.87	4.35

19 x 7 Rotation Resistant



Not recommended for multiple part lifting.

8 x 19 Rotation Resistant

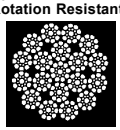


Can be used for multiple part lifting.

DIA. (IN.)	NOMINAL STRENGTH* (TONS) EIP	NOMINAL STRENGTH* (TONS) IPS	APPROX. WT/FT (LBS)
19 X 7 ROTATION RESISTANT ROPE			
3/16	1.57	1.42	.064
1/4	2.77	2.51	.113
5/16	4.30	3.90	.177
3/8	6.15	5.59	.25
7/16	8.33	7.58	.35
1/2	10.8	9.85	.45
9/16	13.6	12.4	.58
5/8	16.8	15.3	.71
3/4	24.0	21.8	1.02
7/8	32.5	29.5	1.39
1	42.2	38.3	1.82
1-1/8	53.1	48.2	2.30
1-1/4	65.1	59.2	2.80
1-3/8	78.4	71.3	3.43
1-1/2	92.8	84.4	4.08
1-5/8	108.0	98.4	4.80
8 X 19 ROTATION RESISTANT ROPE			
7/16	8.97	7.80	.36
1/2	11.7	10.2	.47
9/16	14.7	12.8	.60
5/8	18.1	15.7	.73
3/4	25.9	22.6	1.06
7/8	35.0	30.5	1.44
1	45.5	39.6	1.88
1-1/8	57.3	49.8	2.39
1-1/4	70.5	61.3	2.94
1-3/8	84.9	73.8	3.56
1-1/2	100.0	87.3	4.24

*Acceptance strength is not less than 2-1/2% below the nominal breaking strengths listed.
NOTE: These strengths apply only when a test is conducted with both ends fixed. When in use, the strength of these ropes may be reduced if one end is free to rotate.
**Listed minimum breaking force is for 1960 & 2160 grade bright (ungalvanized) ropes. Inquire for a minimum breaking force of glavanized ropes.
†Other sizes available upon request.

Dyform® - 18HSLR Rotation Resistant



For multi-part lifting. 35% greater strength.

DIA. (IN.)†	NOMINAL STRENGTH* (TONS)	APPROX. WT/FT (LBS)
DYFORM®-18 HSLR ROTATION RESISTANT ROPE		
3/8	8.3	.27
7/16	11.2	.37
1/2	14.6	.51
9/16	18.5	.64
5/8	22.7	.79
3/4	32.4	1.1
7/8	43.8	1.5
1	57.5	2.0
1-1/8	71.5	2.5
1-1/4	87.9	3.1

HIGH PERFORMANCE WIRE ROPE

Constructex® is made of three different strand constructions: 7-wire, 24-wire and 40-wire strands. The nine strands are closed in operation and lightly swaged to postform the rope and give the strands a triangular shape. Compacting increases strength and resistance to crushing. The smooth outside surface enhances abrasion and scrubbing resistance. Constructex® can provide 1-1/2 to 2 times the service life of other wire ropes in severely abusive applications. Typical Applications include: tubing lines, logging lines, winch lines, boom hoists, scrap yard, mobile and overhead traveling cranes, hot bed conveyors, car haulage and marine cargo falls.

CONSTRUCTEX® ROPE		
DIA. (IN.)†	NOMINAL STRENGTH* (TONS)	APPROX WT/FT (LBS)
5/8	25.5	.86
3/4	36.5	1.1
7/8	48.5	1.5
1	62.5	2.0
1-1/8	79.5	2.6
1-1/4	97.6	3.2
1-3/8	118.0	3.8
1-1/2	139.0	4.6
1-5/8	162.0	5.3

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

†Other sizes available upon request.

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

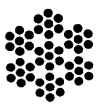
DYFORM®-6				
	NOMINAL STRENGTH* (TONS)		APPROX. WT/FT (LBS.)	
DIA. (IN.)†	IWRC	FIBER CORE	IWRC	FIBER CORE
3/8	8.8	–	.31	–
7/16	11.9	–	.39	–
1/2	15.3	–	.49	–
9/16	19.3	–	.63	–
5/8	22.7	20.0	.78	.71
3/4	32.4	28.6	1.13	1.03
7/8	43.8	38.6	1.54	1.40
1	57.5	50.0	2.00	1.82
1-1/8	71.5	63.0	2.54	2.31
1-1/4	87.9	77.5	3.14	2.85
1-3/8	106.0	93.0	3.80	3.45
1-1/2	125.0	111.0	4.50	4.10

AIR CRAFT CABLE

Aircraft Cable is pre-formed and made in accordance with commerical specifications. GAC to military and federal specifications is available.

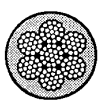
CARBON STEEL AIRCRAFT CABLE

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



7 x 19

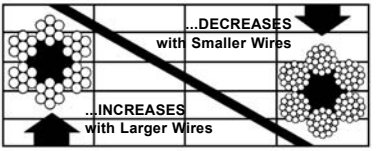
7 X 19		GALVANIZED MIN.	STAINLESS STEEL MIN.
DIA. (IN.)	APPROX. WT. 1000 FT/LBS.	BREAKING STRENGTH (LBS)	BREAKING STRENGTH (LBS.)
3/32	17.	1,000	920
1/8	29.	2,000	1,760
5/32	45.	2,800	2,400
3/16	65.	4,200	3,700
7/32	86.	5,600	5,000
1/4	110.	7,000	6,400
9/32	139.	8,000	7,800
5/16	173.	9,800	9,000
3/8	243.	14,400	12,000



7 x 19

VINYL COATED GALVANIZED AIRCRAFT CABLE				
DIA. (IN.)	COATED TO (IN.)	CONSTRUCTION	APPROX. WT/FT (LBS.)	MIN. BREAKING STRENGTH (LBS.)
3/32	3/16	7 x 7	28	920
1/8	3/16	7 x 7	39	1,700
1/8	3/16	7 x 19	39	2,000
3/16	1/4	7 x 19	78	4,200
1/4	5/16	7 x 19	125	7,000
3/8	7/16	7 x 19	272	14,400

ABRASION RESISTANCE



FATIGUE RESISTANCE

WIRE ROPE

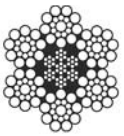
NOMINAL STRENGTHS AND WEIGHTS – 6 X 19 CLASS – 6 X 36 CLASS

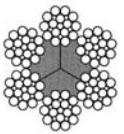
DIAMETER (IN.)	NOMINAL STRENGTH IN TONS OF 2000 POUNDS			APPROXIMATE WEIGHT PER FOOT (LBS.)	
	IMPROVED PLOW STEEL		EXTRA IMPROVED PLOW STEEL		
	FIBER CORE	IWRC	IWRC	FIBER CORE	IWRC
3/16	1.55	1.67	–	.059	.065
1/4	2.74	2.94	3.40	.105	.116
5/16	4.26	4.58	5.27	.164	.18
3/8	6.10	6.56	7.55	.236	.26
7/16	8.27	8.89	10.2	.32	.35
1/2	10.7	11.5	13.3	.42	.46
9/16	13.5	14.5	16.8	.53	.59
5/8	16.7	17.9	20.6	.66	.72
3/4	23.8	25.6	29.4	.95	1.04
7/8	32.2	34.6	39.8	1.29	1.42
1	41.8	44.9	51.7	1.68	1.85
1-1/8	52.6	56.5	65.0	2.13	2.34
1-1/4	64.6	69.4	79.9	2.63	2.89
1-3/8	77.7	83.5	96.	3.18	3.50
1-1/2	92.0	98.9	114.	3.78	4.16
1-5/8	107.	115.	132.	4.44	4.88
1-3/4	124.	133.	153.	5.15	5.67
1-7/8	141.	152.	174.	5.91	6.50
2	160.	172.	198.	6.72	7.39
2-1/8	179.	192.	221.	7.59	8.35
2-1/4	200.	215.	247.	8.51	9.36
2-3/8	222.	239.	274.	9.48	10.4
2-1/2	244.	262.	302.	10.5	11.6
2-5/8	268.	288.	331.	11.6	12.8
2-3/4	292.	314.	361.	12.7	14.0
2-7/8	317.	341.	393.	13.9	15.3
3	–	370.	425.	–	16.6
3-1/8	–	399.	458.	–	18.0
3-1/4	–	429.	492.	–	19.5
3-3/8	–	459.	529.	–	21.0
3-1/2	–	491.	564.	–	22.6

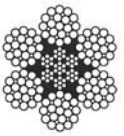
Available galvanized at 10% lower strengths, or in equivalent strengths on special request.

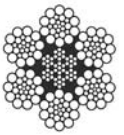
COMMONLY USED WIRE ROPE CROSS SECTIONS

6 x 19 Classification

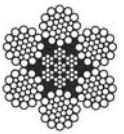

6 x 19 Seale
IWRC

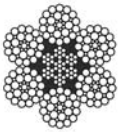

6 x 21 Filler Wire
FC

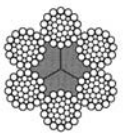

6 x 25 Filler Wire
IWRC

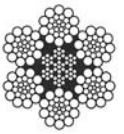

6 x 26 Warrington Seale
IWRC

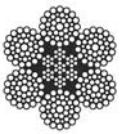
6 x 36 Classification

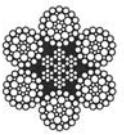

6 x 31 Warrington Seale
IWRC

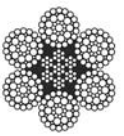

6 x 36 Seale Filler Wire
IWRC

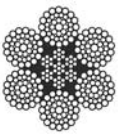

6 x 36 Warrington Seale
FC


6 x 31 Filler Wire Seale
IWRC

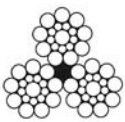

6 x 41 Warrington Seale
IWRC

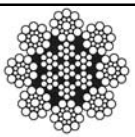

6 x 41 Seale Filler Wire
IWRC

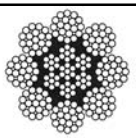

6 x 46 Seale Filler Wire
IWRC

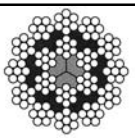

6 x 49 Filler Wire Seale
IWRC

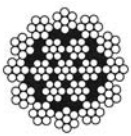
Cross sections of rotation resistant rope constructions.

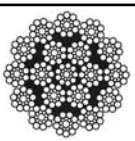

3 x 19 Seale

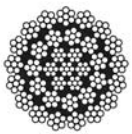

8 x 19 Seale
IWRC

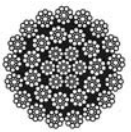

8 x 25 Filler Wire
IWRC


8 x 17
FC


19 x 7


19 x 19 Seale


35 x 7


35 x 19 Seale

INSPECTION – THE KEY TO LONGER, SAFER WIRE ROPE USE

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

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

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

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

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

The Occupational Safety and Health Act has made periodic inspection mandatory for most wire rope applications.

JUST LOOKING AT THE ROPE IS NOT ENOUGH

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

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

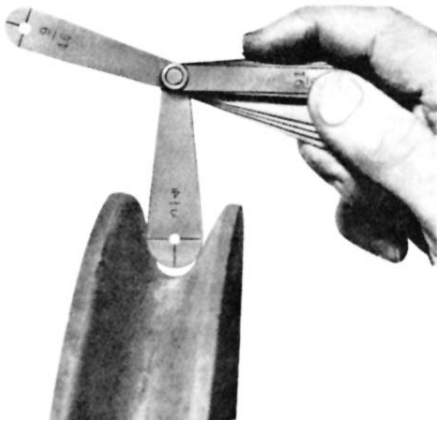
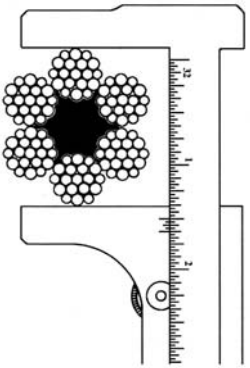
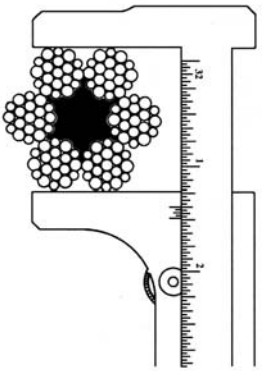


Photo shows new gauge and worn sheave. This new gauge is designed with one-half the allowable oversize (see table). Using the new gauge, when you *do not* see light, the sheave is OK. When you *do* see light under the new gauge, the sheave should be replaced.

NOMINAL ROPE DIAMETER	ALLOWABLE ROPE OVERSIZE	ONE-HALF ALLOWABLE ROPE OVERSIZE
0" - 3/4"	+1/32"	+1/64"
13/16" - 1-1/8"	+3/64"	+3/128"
1-3/16" - 1-1/2"	+1/16"	+1/32"
1-9/16" - 2-1/4"	+3/32"	+3/64"
2-5/16" - and larger	+1/8"	+1/16"



RIGHT WAY. Set the machinist's caliper to read the widest diameter. Vernier scale reads to 1/128th of an inch.



WRONG WAY. This is the wrong way to measure wire rope diameter. Widest diameter is not being read.

SHEAVES SHOULD BE CHECKED FOR:

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

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

Drums should also be inspected for signs of wear that could damage rope. Plain-faced or smooth drums can develop grooves or impressions that prevent rope from winding properly. Repair by resurfacing the face or replacing the lagging.

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

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

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

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

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

MEASURE THE WIDEST DIAMETER

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

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

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

COMMON WIRE ROPE ABUSES

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

CONDITION OF MACHINERY

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

EFFECTS OF SHOCK-LOADING AND VIBRATION

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

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

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

OVERSTRESSING

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

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

CORROSION

Corrosion can seriously shorten wire rope life, both by metal loss and by formation of corrosion pits in the wires. These pits act as stress-concentration points in the wires in much the same manner as do nicks.

CRUSHING. Because of loose winding on drum, rope was pulled inbetween underlying wraps and crushed out of shape.

TOO SUDDEN LOAD RELEASE. The sudden release of a load caused birdcaging. Here individual strands open away from each other, displacing the core.

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

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

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

continued...

WIRE ROPE ABUSE *continued*

Wire rope left on machines shut down for long periods of time deteriorates rapidly. To preserve the rope for future sue, it should be removed, cleaned and thoroughly lubricated.

CAUSES OF CORROSION DAMAGE

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

EFFECTS OF SEVERE HEAT

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

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

SHIFTING ROPES FROM ONE JOB TO ANOTHER

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

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

MACHINERY OPERATION

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

REVERSE BENDING Running this rope over one sheave and under another caused fatigue breaks in wires.

EXCESSIVE EXPOSURE TO ELEMENTS. Too much exposure combined with surface wear and loss of lubrication caused corrosion and pitting.

TOO LONG IN SERVICE. Repeated winding and overwinding of this rope on a drum while it was under heavy stress caused the unusually severe wear shown.

UNDERSIZE SHEAVE GROOVES. Sheaves were too small, causing strands to pinch. Wires then fail in the valley between the strands.

POOR WORK PROCEDURES. Damage to strands and wires resulted from electric arcing.

LACK OF KNOWLEDGE. Here's what occurs when a loop which has been "pulled through" and tightened remains in service.

ABRASION AND BENDING

THE "X CHART": ABRASION RESISTANCE VS. BENDING-FATIGUE RESISTANCE

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

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

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

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

EFFECT OF SHEAVE SIZE

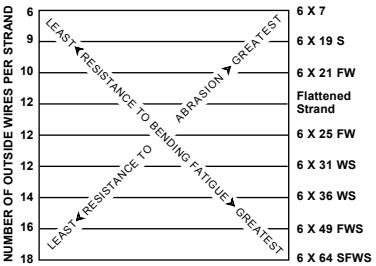
Wire ropes are manufactured in a great variety of constructions to meet the varying demands of wire rope usage. Where abrasion is an important factor, the rope must be made of a coarse construction containing relatively large wires. In other cases, the great amount of bending to which the rope is subjected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

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

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

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

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



PROPER SHEAVE AND DRUM SIZES

CONSTRUCTION	SUGGESTED D/d* RATIO	MINIMUM D/d*RATIO
6 x 7	72	42
19 x 7 or 18 x 7 Rotation Resistant	51	34
6 x 19 Seale	51	34
6 x 27 H flattened strand	45	30
6 x 31 V flattened strand	45	30
6 x 21 filler wire	45	30
6 x 25 filler wire	39	26
6 x 31 Warrington Seale	39	26
6 x 36 Warrington Seale	35	23
8 x 19 Seale	41	27
8 x 25 filler wire	32	21
6 x 41 Warrington Seale	32	21
6 x 42 filler	21	14

ROPE STRENGTH AND DESIGN FACTORS

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

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

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

O.S.H.A. (A.N.S.I.) Removal Criteria 5. A.N.S.I. Safety Codes, Standards and Requirements –

rope must be removed from service when diameter loss or wire breakage occurs as follows:

DIAMETER LOSS

ORIGINAL DIAMETER (IN.)	LOSS (IN.)
5/16 & smaller	1/64
3/8 - 1/2	1/32
9/16 - 3/4	3/64
7/8 - 1-1/8	1/16
1-1/4 - 1-1/2	3/32

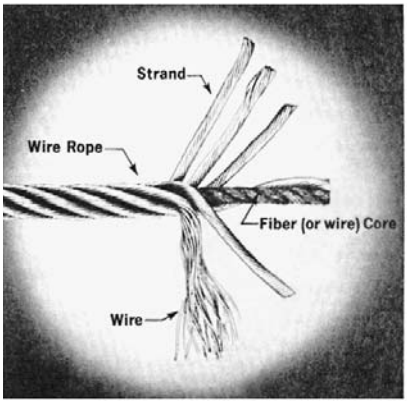
NUMBER OF WIRE BREAKS

A.N.S.I. NO.	EQUIPMENT	NUMBER BROKEN WIRES IN RUNNING ROPES		NUMBER BROKEN WIRES IN STANDING ROPES	
		IN ONE ROPE LAY	IN ONE STRAND	IN ONE ROPE LAY	IN ONE STRAND
B30.2	Overhead & Gantry Cranes	12	4	Not specified	Not specified
B30.4	Portal, Tower & Pillar Cranes	6	3	3	2
B30.5	Crawler, Locomotive & Truck Cranes	6	3	3	2
B30.6	Derricks	6	3	3	2
B30.7	Base Mounted Drum Hoists	6	3	3	2
B30.8	Floating Cranes & Derricks	6	3	3	2
A10.4	Personnel Hoists	6*	3	2*	2
A10.5	Material Hoists	6*	Not specified	Not specified	Not specified

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

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

ROPE STRENGTH AND DESIGN FACTORS



UNDERSTAND WHAT THE "LAYS" OF WIRE ROPE MEAN

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

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

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

HERE ARE SOME EXCEPTIONS

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

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

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

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

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

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

The number of wires per strand may vary from 3 to 91, with the majority or wire ropes falling into the 7-wire, 19-wire, or 36 wire strand categories.

LENGTH OF SERVICE DEPENDS ON HOW YOU TREAT YOUR WIRE ROPES.

RIGHT LAY REGULAR LAY

LEFT LAY REGULAR LAY

RIGHT LAY LANG LAY

LEFT LAY LANG LAY

EVERY LIFT USES 1 OF 3 BASIC HITCHES

STRAIGHT OR VERTICAL, attachment, is simply using a sling to connect a lifting hook to a load. Full rated lifting capacity of the sling may be utilized, but must not be exceeded. Whenever a single sling is used in this manner, a tagline should be used to prevent load rotation which may cause damage to the sling.

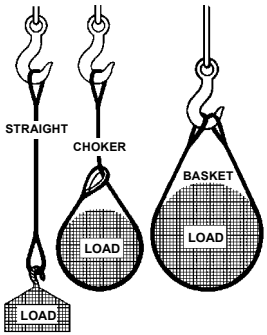
When two or more slings are attached to the same lifting hook in straight or vertical manner, the total hitch becomes, in effect, a lifting bridle, and the load is distributed among the individual slings.

CHOKER hitches reduce lifting capability of a sling, since this method of rigging affects ability of the wire rope components to adjust during the lift. A choker is used when the load will not be seriously damaged by the sling body – or the sling damaged by the load, and when the lift requires the sling to snug up against the load.

The diameter of the bend where the sling contacts the load should keep the point of choke against the sling BODY – never against a splice or the base of the eye. When a choke is used, the sling rated capacity must be adjusted downward to compensate for loss of capability.

A choker hitch should be pulled tight before a lift is made – NOT PULLED DOWN DURING THE LIFT. It is also dangerous to use only one choker hitch to lift a load which might shift or slide out of the choke.

BASKET hitches distribute a load between the two legs of a sling – within limitations described below. Capacity of a sling used in a basket is affected by the bend, or curvature, where the sling body comes in contact with the load – just as any sling is affected and limited by bending action, as over a sheave.



CALCULATING THE LOAD ON EACH LEG OF A SLING

As the horizontal angle between the legs of a sling decreases, the load on each leg increases. The effect is the same whether a single sling is used as a basket, or two slings are used with each in a straight pull, as with a 2-legged bridle.

Anytime pull is exerted at an angle on a leg – or legs – of a sling, the load per leg can be determined by using the data in the table at right. Proceed as follows to calculate this load – and determine the rated capacity required of the sling, or slings, needed for a lift.

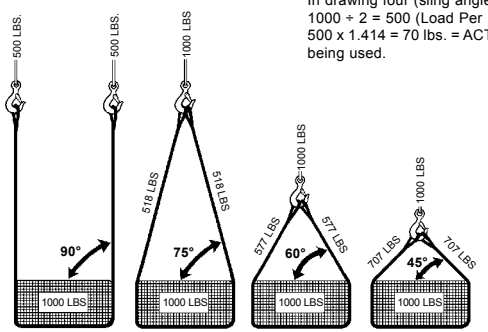
1. First, divide the total load to be lifted by the number of legs to be used. This provides the load per leg if the lift were being made with all legs lifting vertically.

2. Determine the angle.

3. Then MULTIPLY the load per leg (as computed in No. 1 above) by the Load Factor for the leg angle being used (from the table below) – to compute the ACTUAL LOAD on each leg for this lift and angle. THE ACTUAL LOAD MUST NOT EXCEED THE RATED SLING CAPACITY.

Thus, in drawing three (sling angle at 60°):
1000 ÷ 2 = 500 (Load Per Leg if vertical lift)
500 x 1.154 = 577 lbs. = ACTUAL LOAD on each leg at the 60° HORIZ angle being used.

In drawing four (sling angle of 45°):
1000 ÷ 2 = 500 (Load Per Leg if a vertical lift)
500 x 1.414 = 70 lbs. = ACTUAL LOAD on each leg at the 45° HORIZ angle being used.



LEG ANGLE (DEGREES)	LOAD FACTOR
90°	1.000
85°	1.003
80°	1.015
75°	1.035
70°	1.064
65°	1.103
60°	1.154
55°	1.220
50°	1.305
45°	1.414

Basic Lift Engineering

Hanes SUPPLY, INC.
YOUR SLING AND RIGGING SPECIALIST

EFFECT OF ANGLES

Various sling manufacturers refer in their specification tables to leg angles of slings during lifts – since these angles have a direct relationship to lifting capability of a sling. Regardless of how the sling angle may be stated, or the method used to compute stress in a sling leg, the sling is the same. Capacity does not change – but stresses on sling legs change with rigging angles.

Much misunderstanding results because the carrying capacity of a sling leg is reduced by the rigging angle. What happens is that the operator is lifting the load straight up (vertical) while the legs are pulling at an angle, thereby causing a disadvantage.

For quick figuring in the shop, a 60-degree leg angle causes a loss in lifting capacity of 15%... a 45-degree angle reduces capacity by 30%... and a 30-degree angle, 50%. This rule of thumb is not 100% accurate, but is easy to remember and slightly on the safe side.

It is always good practice, within limits, to keep the sling leg angle as large as possible. The length and width of the load sling length, and available headroom are determining factors in this sling angle.

It is neither economical nor good practice to exceed a 45-degree sling leg angle.

Angles less than 45 degrees not only build up tension in the sling legs out of all proportion to the weight of the load, they also create a much greater "in-pull" on the ends of the load. This produces eccentrically loaded column effect, as an engineer would describe it – meaning simply that long, slender objects have a tendency to buckle. Angles less than 45 degrees indicate some thought should be given to the use of a lifting beam or other device in connection with the lift.

Studying typical sling charts readily reveals that lifting capacities on slings are misleading unless the sling angle is stated. The same sling that will handle 10 tons at an 85-degree leg angle will only handle 5 tons if this angle is decreased to 30 degrees.

GOOD SLING PRACTICE

Regardless of what type of sling may be employed, there are accepted good working rules which will help increase useful sling life – as well as improve safety. These include:

1. Use the proper sling for the lift. Whether Twin-Path, Web, Chain, or Wire Rope, the proper sling is the one with the best combination of work and handling feature – of the proper length and rated capacity for the situation.
2. Start and stop slowly. Crane hooks should be raised slowly until the sling becomes taut and the load is suspended. Lifting or lowering speed should be increased or decreased gradually. Sudden starts or stops place heavier loads on a sling – comparable to jamming the brakes on a speeding automobile. A rule of thumb: Shock loads can double the stress on a sling.
3. If possible, set the load on blocks. Pulling a sling from under a load causes abrasion and "curling" – making the sling harder to handle on the next lift, while reducing strength through loss of metal.
4. Sharp corners cut slings. Use protector arcs, Cornermax™ and Synthetic Armor Wear Pads between sharp corners and the sling body.
5. Store in a dry room. Moisture is a natural enemy of wire rope – as are acid fumes and other caustic gases.
6. Avoid handling hot material or objects in direct contact with the sling. Strength goes down as temperature goes up!
7. Dropping casting, tools or heavy objects on slings, or running over them with trucks, can cause damage. Always hang slings when not in use.
8. Use hooks properly. "Point loading" reduces hook capacity. Pull should be straight in the line of lift.

SELECTING A SLING

The following is presented as a guide only to help in selection of a sling for a lift.

1. Determine the Load: The weight of the load must be known. This is always the starting point.
2. Decide the Hitch: Shape and bulk of the load must be accommodated as well as weight. Determine whether a straight attachment at some point on the load, a choker around the load, or some form of basket hitch will best control the load during the lift.
3. Adequacy of Lifting Device: The lifting device must have adequate capacity for making the lift, and provide any maneuverability required once the load is hoisted.
4. Room to Lift: Make certain the lifting device has sufficient headroom to raise the load to the height required. Headroom will affect the length of sling.
5. Length of Sling: By applying your decision on the type of hitch to knowledge of the headroom offered by the lifting device, the length of sling can be calculated.
6. Use Rated Capacity Chart: Always double-check that the sling type and capacity you choose, when rigged at the angle determined by the length of the sling, or the specific type of hitch, will handle the load.

Attaching the sling and completing the lift should be an orderly procedure without "surprises" when these steps have been followed. Two further precautions should be noted, however.

First, plan to protect both load and sling from damage at sharp corners, etc. Cornermax™ and Synthetic Armor Wear Pads should be provided at the lift site. A protective pad should be used anytime a sling passes around a sharp corner.

Last – by no means unimportant by being last – every sling should be visually examined from end to end BEFORE EVERY LIFT. It must always be kept in mind that the manufacturer's Rated Capacity applies only to a new sling in "unused" condition. A sling should be carefully examined to determine that it is in as nearly new condition as practicable before each lift.

There are specific standards on the use and care of slings in industries such as shipping and construction, and these provide some guidance for sling inspectors. Consensus standards published as ANSI B30.9 are particularly helpful.

ANSI Standard B30.9 specifies that a wire rope sling should be removed form service any time any of the following conditions are detected:

1. Ten randomly distributed broken wires in one rope lay, or five broken wires in one strand in one rope lay.
2. Kinking, crushing, bird caging or any other damage resulting in distortion of the wire rope structure.
3. Evidence of heat damage.
4. End attachments that are cracked, deformed, or worn.
5. Hooks that have been opened more than 15% of the normal throat opening measured at the narrowest point, or twisted more than 10 degrees from the plane of the unbent hook.
6. Corrosion of the rope or end attachments.

It is apparent from the foregoing that inspection of a wire rope sling to meet these removal criteria requires more than a casual understanding of wire rope design and manufacture, and the responsibility for daily inspections must be in the hands of trained personnel.

Most of the foregoing applies equally to any type of sling and careful inspection by a trained inspector is necessary for safe sling use. If you require training for any type of sling inspection, contact Hanes Supply for more information.

BLOCK TWISTING

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

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

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

1. Reduced wire rope length. Longer rope lengths cause more twisting than short rope lengths. This applies particularly to the amount of wire rope in the "falls."
2. Reduce the amount of load lifted. Heavily loaded ropes have more torque and twist than lightly loaded ropes. This condition would also apply to the speed of loading or "shock" loading, since this condition also causes higher wire rope loading.
3. Eliminate "odd-part" reeving, where the wire rope "dead-end" is on the traveling block. Wire rope torque, from the application of load, is greatest at the rope dead-end.
4. Relocate the rope dead-end at the boom, in order to increase the separation between the dead-end and the other rope parts. This applies a stabilizing load directly to the traveling block. The original equipment manufacturer should be consulted before making this modification.
5. Increase sheave size. This increases the amount of separation between wire rope parts and may improve the situation by applying stabilizing loads and reducing the amount of rope torque transmitted to the traveling block.
6. Restrain the twisting block with a "tag" line. One or more of the foregoing suggestions may eliminate the problem without resorting to "specialized" wire rope which may not only be difficult to locate but expensive as well.

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

ELASTIC STRETCH

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

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

The modulus of elasticity is given below.

APPROXIMATE MODULUS OF ELASTICITY
(POUNDS PER SQUARE INCH)

ROPE CLASSIFICATION	ZERO THROUGH 20% LOADING	21 TO 65% LOADING*
6 x 7 with fiber core	11,700,000	13,000,000
6 x 19 with fiber core	10,800,000	12,000,000
6 x 36 with fiber core	9,900,000	11,000,000
8 x 19 with fiber core	8,100,000	9,000,000
6 x 19 with IWRC	13,500,000	15,000,000
6 x 36 with IWRC	12,600,000	14,000,000

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

PHYSICAL PROPERTIES

ELASTIC PROPERTIES OF WIRE ROPE

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

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

1. *constructional*, and
2. *elastic*.

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

CONSTRUCTIONAL STRETCH

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

Constructional stretch is influenced by the following factors:

1. type of core (fiber or steel),
2. rope construction (6 x 7, 6 x 25 FW, 6 x 41 WS, 8 x 19 S, etc.),
3. length of lay
4. material.

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

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

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

ROPE CONSTRUCTION	APPROX. STRETCH*
6 strand FC	1/2% - 3/4%
6 strand IWRC	1/4% - 1/2%
8 strand FC	3/4% - 1%

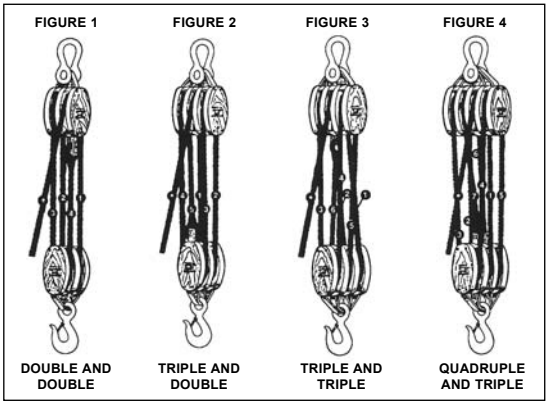
*Varies with the magnitude of the loading.

THE REEVING OF TACKLE BLOCKS

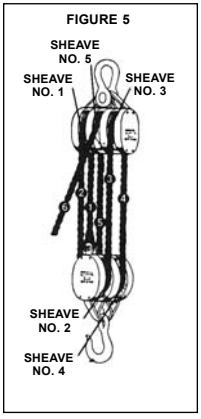
In reeving a pair of tackle blocks, one of which has more than two sheaves, the hoisting rope should lead from one of the center sheaves of the upper block.

When so reeved, the hoisting strain comes on the center of the blocks and they are prevented from toppling, with consequent injury to the rope by cutting across the edges of the block shell.

To reeve by this method, the two blocks should be placed so that the sheaves in the upper block are at right angles to those in the lower one, as shown in the following illustrations. Start reeving with the becket, or standing end, of the rope.



It is good practice to use a shackle block as the upper one of a pair and a hook block as the lower one. A shackle would prevent any accidental disengagement of the block from its attaching point in the event of an unusual movement of the attaching point or block. The lower block having a hook is more readily attached or detached from the load. See Figures 1 through 5.



VARYING SHEAVE REVOLUTIONS IN A PAIR OF TACKLE BLOCKS

To raise a load one foot, the lower block must be raised one foot, and in accomplishing this, each working rope must be shortened one foot.

In the example above, Ropes 1, 2, 3, etc., must be shortened one foot to raise the load one foot. Assuming that the circumference of each sheave is one foot, Sheave No.1 must make one revolution to shorten Rope No. 1; Sheave No. 2 must make one revolution to take up the one foot slack form Rope No. 1 and one additional revolution to shorten Rope No. 2; Sheave No. 3 must make two revolutions to take up the two feet of slack from Ropes 1 and 2 and one additional revolution to shorten Rope No. 3, etc. for each succeeding sheave.

Viz: Rope No. 1 must travel one foot on Sheave No. 1.
Rope No. 2 must travel two feet on Sheave No. 2.
Rope No. 3 must travel three feet on Sheave No. 3.
Rope No. 4 must travel four feet on Sheave No. 4.
Rope No. 5 must travel five feet on Sheave No. 5.

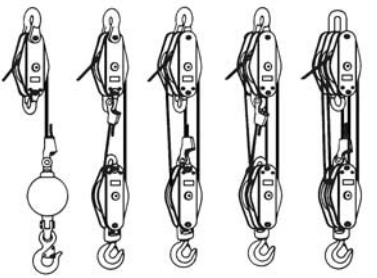
Therefore, all the sheaves in a set of blocks revolve at different rates of speed. Sheave No. 2 rotates twice as fast as No. 1, Sheave No. 3 rotates three times as fast as No.1, Sheave No. 4 four times as fast as No. 1, etc. Consequently the sheaves nearest the lead line, rotating at higher rates of speed, wear out more rapidly.

All sheaves should be kept well lubricated when in operation to reduce friction and wear.

HOW TO FIGURE LINE PARTS

NUMBER OF PARTS OF LINE	RATIO FOR BRONZE BUSHED SHEAVES	RATIO FOR ANTI-FRICTION BEARING SHEAVES
1	.96	.98
2	1.87	1.94
3	2.75	2.88
4	3.59	3.81
5	4.39	4.71
6	5.16	5.60
7	5.90	6.47
8	6.60	7.32
9	7.27	8.16
10	7.91	8.98
11	8.52	9.79
12	9.11	10.6
13	9.68	11.4
14	10.2	12.1
15	10.7	12.9
16	11.2	13.6
17	11.7	14.3
18	12.2	15.0
19	12.6	15.7
20	13.0	16.4
21	13.4	17.0
22	13.8	17.7
23	14.2	18.3
24	14.5	18.9

To help figure the number of parts of line to be used for a given load or the line pull required for a given load, the following ratio table is provided with examples of how to use it:



USING THE RATIO TABLE RATIO FORMULA

$$\frac{\text{TOTAL LOAD TO BE LIFTED}}{\text{SINGLE LINE PULL IN POUNDS}} = \text{RATIO}$$

Example:
To find the *number of parts of line* needed when weight of load and single line pull is established.

Sample Problem:
72,480 lbs. (load to be lifted)
8,000 lbs. (single line pull) = 9.06 RATIO

Refer to ratio 9.06 in table or number nearest to it, then check column under heading "Number of Parts of Line"... 12 parts of line to be used for this load.

Example:
To find *single line pull* needed when weight of load and number of parts of line are established.

Sample Problem:
68,000 lbs. (load to be lifted)
6.60 (ratio of 8 part line)
= 10,300 lbs. (single line pull)

10,300 lbs. single line pull required to lift this load on 8 parts of line.

LOADS ON BLOCKS

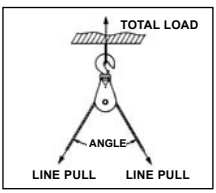
The Rated Load Values for blocks shown in Crosby Group literature are shown as "Working Loads," "Safe Working Load" and "Resultant Safe Working Load"; and all these terms are defined as the maximum amount of total load that should be exerted on the block and its fitting, the fitting being a hook, shackle, eye, loop, etc.

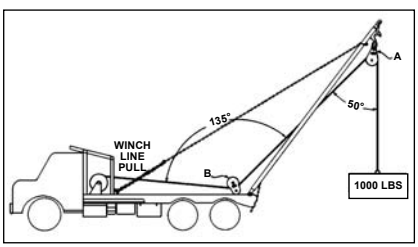
It must be recognized that this total load value MAY BE DIFFERENT than the weight being lifted or pulled by a hoisting or hauling system and, therefore, it is necessary to determine the total load being imposed on each block in the system in order to properly determine the rated capacity block to be used.

A single sheave block that is used to change direction of a load line can be subjected to total loads GREATLY DIFFERENT than the weight being lifted or pulled. The amount of total load changes with the angle between the incoming and departing lines to the block.

The following chart indicates the factor that is multiplied by the line pull to obtain the total load on the block:

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





Example: A gin pole truck being used to lift a weight of 1,000 lbs.

There is no mechanical advantage to a single part load line system, so, whinch line pull is equal to 1,000 lbs. or the weight being lifted.

Total load on snatch block shown as A equals 1,000 lbs. times angle factor for 50°.

Total load on A = 1,000 x 1.81 = 1,1810 lbs.

Total load on toggle block shown as B equals 1,000 lbs. times angle factor for 135°.

Total load on B = 1,000 x .76 = 760 lbs.

Example: Hoisting system using a traveling block to lift a weight of 1,000 lbs.

The mechanical advantage at the traveling block C is 2 because 2 parts of a load line support the 1,000 lbs. weight; so, the line pull equals the 1,000 lbs. divided by 2 or 500 lbs.

Total load on traveling block shown as C equals 500 lbs. times angle factor for 0°.

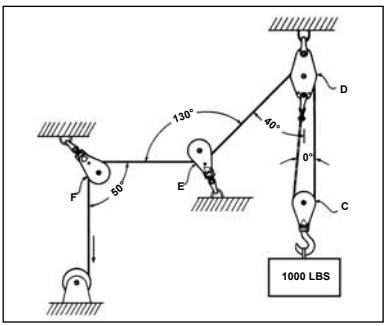
Total Load on C = 500 x 2.00 = 1,000 lbs.

Total load on stationary block shown as D equals the dead end load of 500 lbs. plus the line pull of 500 lbs. times the angle factor for 40°.

Total Load on E = 500 x .84 = 420 lbs.

Total load on block shown as F equals 500 lbs. times the angle factor for 90°.

Total Load on F = 500 x 1.41 = 705 lbs.



DEFINITIONS OF TERMS

Abrasion: The mechanical wearing of surface resulting from frictional contact with materials or objects.

Breaking Strength: That total force (lbs. or kg.) at which the sling fails. The total weight strain which can be applied before failure. Usually at five times the rated capacity.

Competent Person: A person designated for inspection who is trained, qualified by knowledge and practical experience and the necessary instructions to enable the required test or examination to be carried out.

Twin-Path® Core: The load bering multiple fibers of polyester, aramids, or K-Spec™ which, when wound into the seamless tubes, become the load bearing yarns of the sling. If other materials are used, follow the manufacturers recommendations.

Twin-Path® Cover: The seamless tubes, usually at least two separate and contrasting colors for easier inspection that contain the cores. Covers may be of polyester, Covermax nylon, or aramids depending on the desired finished characteristics of the product.

Elongation: The measurement of stretch, expressed as a percentage of the finished length.

Fitting: A load bearing metal component which is fitted to the sling. Can be of steel, aluminum or other material that will sustain the rated capacity of the sling.

Hitch/Vertical:  A method of attachment whereby the sling extends from the crane hook to the load in a straight connection.

Hitch/Choker:  The sling is passed around the load and back through itself and is connected to the crane hook. The sling then tightens around the load when it is strained.

Hitch/Basket:  The sling is passed from the crane hook around the load and attached to the crane hook.

Length: The distance between bearing points of the sling.

Proof Load Test: A non-destructive load test usually to twice the rated capacity of the sling.

Synthetic Fiber: Man-made material used for the cover, the core and the thread of the Twin-Path® sling products.

Tattle-Tails: Tell-Tails which extend past the tag area of Twin-Path® slings. Extension of the load core yarns. When the sling is stretched beyond its elastic limit, they shrink and eventually disappear under the tag. Take out of service if less than 1/2" is exposed.

Thread: The synthetic yarn which is used to sew the sling covers and tag and to provide the stitch which separates the individual load cores.

Twin-Path®: A patented and trademarked product which is composed of two separate load cores and two contrasting color covers.

DEFINITIONS

Rated Load Value-Rated Capacity: The maximum recommended load that should be exerted on the item. The following terms are also used for the term Rated Load: "SWL," "Safe Working Load," "Working Load," "Working Load Limit," and the "Resultant Safe Working Load." All rated load values, unless noted otherwise, are for in-line pull with respect to the centerline of the item.

Proof Load: The average load to which an item may be subjected before visual deformation occurs or a load that is applied in the performance of a proof test.

Proof Test: A term designating a tensile test applied to the item for the sole purpose of detecting injurious defects in the material or manufacture.

Ultimate Load: The average load at which the item is being tested fails or no longer supports the load.

Shock Load: A resulting load from the rapid change of movement, such as impacting or jerking, or a static load. A Shock Load is generally significantly greater than the static load.

Design Factor: An industry term denoting theoretical reserve capability. Usually computed dividing the catalog stated ultimate load by the catalog stated working load limit and generally expressed as a ratio, for example: 5 to 1.

CAUTIONS OR WARNINGS

All ratings shown in this literature are based upon the items being new or "in as new" condition. Catalog ratings are considered to be the greatest load that should be applied to the item; therefore, any shock loading must be considered when selecting the item for use in a system.

The products shown in this literature are subject to wear, misuse, overloading, corrosion, deformation, intentional alteration and other usage factors which may necessitate a reduction in the product's Rated Capacity or a reduction in its Design Factor. Therefore, it is recommended that all products be regularly inspected to determine their condition as a basis for deciding if the product may continue to be used at the catalog assigned WL, a reduced WL, a reduced design factor, or removed from service.

SUMMARY OF COMMON CONVERSIONS

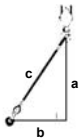
FACTORS

IF YOU KNOW:	MULTIPLY BY:	TO FIND:
inches	25.4	millimeters (mm)
inches	2.54	centimeters (cm)
feet	0.30	meters (m)
yards	0.3711	meters (m)
miles	1.61	kilometers (km)
millimeters	.0394	inches
centimeters	.39	inches
meters	3.28	feet
meters	1.09	yards
kilometers	.62	miles
metric tons	1.102	U.S. tons
U.S. tons	.9072	metric tons
kilograms	2.204	pounds
pounds	.453	kilograms
metric tons	2204.62	pounds
metric tons	1000.0	kilograms
Fahrenheit (temp.)	5/9 (after subtracting 32)	Celsius (temp.)
Celsius (temp.)	9/5 (then add 32)	Fahrenheit (temp.)

DECIMAL / METRIC EQUIVALENT TABLE

FRACTION (IN.)	DECIMAL (IN.)	METRIC (MM.)
1/16	.0625	1.588
1/8	.1250	3.175
3/16	.1875	4.762
1/4	.2500	6.350
5/16	.3125	7.938
3/8	.3750	9.525
7/16	.4375	11.112
1/2	.5000	12.700
9/16	.5625	14.288
5/8	.6250	15.875
11/16	.6875	17.462
3/4	.7500	19.050
13/16	.8125	20.638
7/8	.8750	22.225
15/16	.9375	23.812
1	1.0000	25.400

FINDING THE HYPOTENUSE

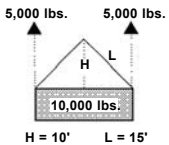


To find c (hypotenuse)

Given: $a^2 + b^2 = c^2$

Example: $4^2 + 3^2 = c^2$; $16 + 9 = c^2$; $\sqrt{25} = 5$

LOAD ANGLE FACTORS

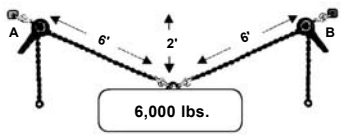


$\frac{L}{H}$ = LAF *(Load Angle Factor)* Example: $\frac{15}{10}$ = 1.5 *(LAF)*

Tension in L = $\frac{L}{H}$ x L's share of the load

Tension in L = $\frac{15}{10}$ x 5,000; 1.5 x 5,000 Ten. = 7,500 lbs.

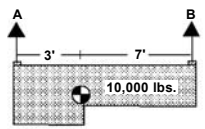
TENSION IN OVERHEAD HOISTS



Ten. in A = $\frac{6}{2}$ x 3,000 Ten. in A = 9,000 lbs.

(As load moves, tension changes)

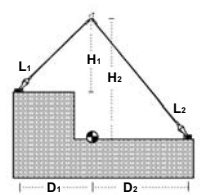
OFF-SET CENTER OF GRAVITY (SHARE OF THE LOAD)



Inverse Proportion To Distance

Lift Point A	Lift Point B
7 + 3 = 10, $\frac{}{10}$ = .70	7 + 3 = 10, $\frac{}{10}$ = .30
.70 x 10,000 = 7,000 lbs.	.30 x 10,000 = 3,000 lbs.

OFF-LEVEL LIFT POINTS



$$TL_1 = \frac{W \times D_2 \times L_1}{(D_2 \times H_1) + (D_1 \times H_2)}$$

$$TL_2 = \frac{W \times 1 \times L_2}{(D_2 \times H_1) + (D_1 \times H_2)}$$

LEGEND
W = Load Weight
L_1 = Length Leg 1
L_2 = Length Leg 2
H_1 = Vertical Height 1
H_2 = Vertical Height 2
D_1 = Horizontal Distance 1
D_2 = Horizontal Distance 2

Weights of Material

MATERIALS AND LIQUIDS – POUNDS/CU. FT.			
Aluminum	165	Granite	96
Asbestos	153	Iron Casting	450
Asphalt	81	Lead	710
Brass	524	Limestone	95
Brick, Soft	100	Lumber – Fir	32
Brick, Medium	115	Lumber – Oak	62
Brick, Hard	130	Lumber – RR Ties	50
Bronze	534	Marble	95
Coal	56	Oil, Motor	60
Concrete, Reinforced	150	Paper	58
Copper	556	Portland Cement, Loose	94
Crushed Rock	95	Portland Cement, Set	183
Diesel	52	River Sand	120
Dry Earth, Loose	75	Rubber	94
Dry Earth, Packed	95	Steel	490
Gasoline	45	Water, Fresh	63
Glass	16	Zinc	437

MATERIALS – POUNDS/SQ. FT.			
Steel Plate		Aluminum Plate	
1/8"	5	1/8"	1.75
1/4"	10	1/4"	3.50
1/2"	20	1/2"	7.00
3/4"	30	3/4"	10.50
1"	40	1"	14.00

FORMULAS AND INFORMATION

H = Height **W** = Width **L** = Length **d** = diameter **r** = radius (1/2 dia.)

π = 3.14 (rounded 3.15) [area of a square or rectangle = HW]

[Vol of cube = HWL] [Circumference of circle = πd] [area of a circle = πr^2

or the approximate area of a circle = 80% of the dia^2 (dia x dia x .80)]

USA Standard Crane Hand Signals

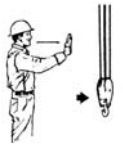
Hanes SUPPLY, INC.
YOUR SLING AND RIGGING SPECIALIST

Use Main Hoist. Tap fist on head; then use regular signals.

Use Whipline. (Auxiliary Hoist). Tap elbow with one hand, then use regular signals.

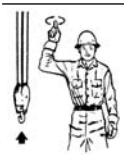
Raise Boom. Arm extended, fingers closed, thumb pointing upward.

Lower Boom. Arm extended, fingers closed, thumb pointing downward.



Travel. Arm extended forward, hand open and slightly raised, make pushing motion indirection of travel.

Swing. Arm extended, point with finger in direction of swing of boom.



Hoist. With forearm vertical, forefinger pointing up, move hand in small horizontal circle.

Lower. With arm extended downward, forefinger pointing down, move hand in small horizontal circles.

Raise the Boom and Lower the Load. With arm extended, thumb pointing up, flex fingers in and out as long as load movement is desired.

Lower the Boom and Raise the Load. With arm extended, thumb pointing down, flex fingers in and out as load movement is desired.

Travel. (One Track). Lock the track on side indicated by raised fist. Travel opposite track in direction indicated by circular motion of other fist, rotated vertically in front of body. (For crawler cranes only).

Travel. (Both Tracks). Use both fists in front of body, making a circular motion about each other, indicating direction of travel; forward or backward. (For crawler cranes only.)

Additional Signals for Bridge Cranes

Extend Boom. (Telescoping Booms). Both fists in front of body with thumbs pointing outward

Retract Boom. (Telescoping Booms). Both fists in front of body with thumbs pointing toward each other.

Stop. Arm extended, palm down, hold position rigidly.

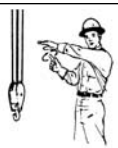
Emergency Stop. Arm extended, palm down, move hand rapidly right and left.

Bridge Travel. Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.

Trolley Travel. Palm up, fingers closed, thumb pointing in direction of motion, jerk hand horizontally.

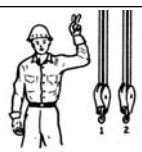
Extend Boom. (Telescoping Boom). One Hand Signal. One fist in front of chest with thumb tapping chest.

Retract Boom. (Telescoping Boom). One Hand Signal. One fist in front of chest, thumb pointing outward and heel of fist tapping chest.



Move Slowly. Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal. (Hoist slowly shown as example.)

Dog Everything. Clasp hands in front of body.



Multiple Trolleys. Hold up one finger for block marked "1" and two fingers for block marked "2". Regular signals follow.

Magnet is Disconnected. Crane Operator spreads both hands apart palms up.

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