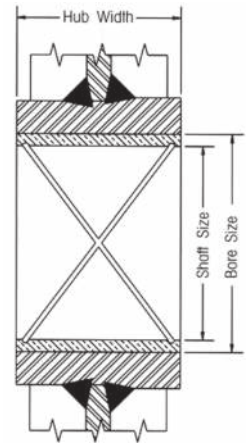
McKissick® Sheaves Bearings Application Information

BRONZE BUSHING



Slow line speed, moderate load and moderate use

- Maximum Bearing Pressure (BP): 31N/mm²
- Maximum Velocity at Bearing (BV): 366m/min
- Maximum Pressure Velocity Factor (PV): 114

$$\text{Formula for BP} = \frac{\text{Line Pull x Angle Factor}}{\text{Shaft Size x Hub Width}}$$

For underwater sheave applications, special bronze bushings are available. Consult the bearing manufacturer for applicable load.

Example

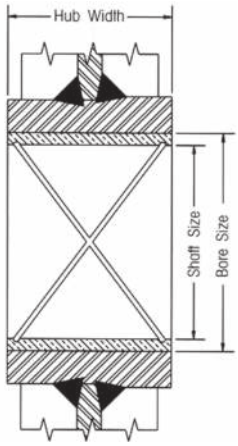
Using a 356mm sheave (917191) with a 20,000 N line pull and an 80 degree angle between lines, determine maximum allowable line speed:

$$BP = \frac{\overset{\text{Line Pull}}{20{,}000\text{N}} \times \overset{\text{Angle Factor}}{1.53}}{\underset{\text{Shaft Size}}{38} \times \underset{\text{Hub Width}}{41}} = 2{,}896 \text{ PSI}$$

$$BV = \frac{\overset{\text{PV Factor}}{114}}{\underset{\text{BP}}{19{,}64}} = 5{,}8\text{m/min}$$

ROLLER BEARINGS

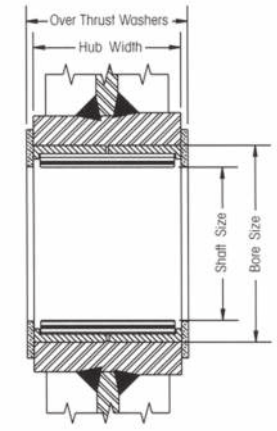
Bronze Bushings with Fig. 8 oil grooves are made from SAE 660 bronze for cold-finished shafts.



Roller Bearings are designed to operate on shafts carborized to 60 Rockwell C and grounded to +/- .0005 of shaft size.

STANDARD STRAIGHT ROLLER BEARINGS

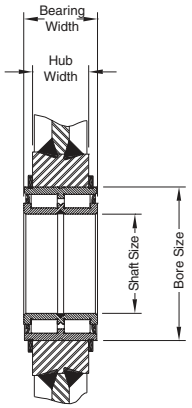
Heavier loads, higher speeds, more frequent use, radial loads only.



Roller Bearings without inner races are designed to operate on shafts carborized to 60 Rockwell C and grounded to +/- .0005 of shaft size.

FULL COMPLEMENT, DOUBLE ROW, ROLLER BEARING

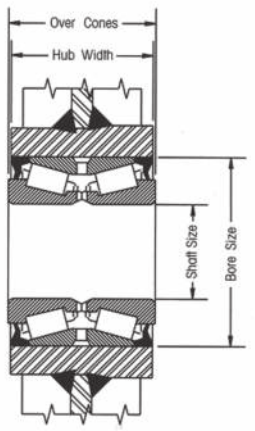
Heavy load, high speeds, continuous operation, axial, and radial loads.



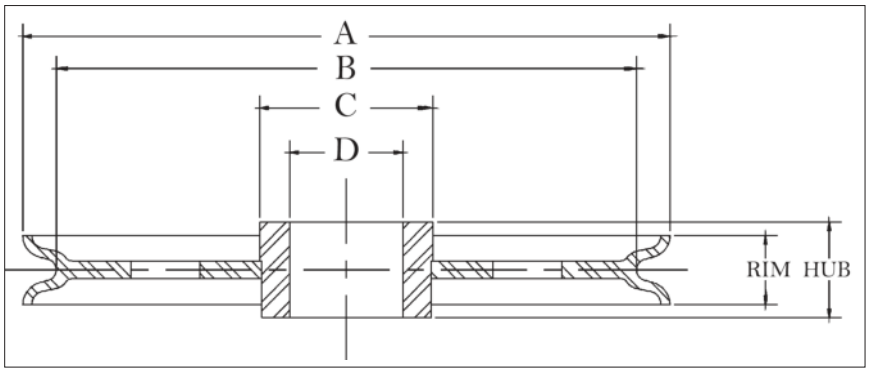
Cylindrical Roller Bearings with snap ring grooves are complete units with outer and inner rings, rib-guided cylindrical rollers, and sealing rings. They can support axial forces in both directions, as well as radial forces. They have high dynamic and static load ratings.

TAPERED ROLLER BEARINGS

Heavy loads, high speeds, continuous operation, axial, and radial loads.



Tapered Bearings are designed to operate on shafts machined to +/- .0005 of shaft size. Applications should provide for tightening separator plates against bearing cones to adjust and insure proper function of bearings.



APPLICATION AND WARNING INFORMATION
SECTION 17

McKissick® Plain Bore Sheaves

- Roll-Forged™ sheaves are available in sizes up to 1981mm diameter.
- McKissick® Plain Bore Sheaves can be equipped with bushings or bearings at an optional charge.
- 356mm diameter sheaves and larger are Roll-Forged with Flame hardened grooves to minimum Rockwell 35C, unless otherwise noted.

"A" Nominal Outside Diameter (mm)	Stock Number	Wire Rope Diameter (mm)	"D" Bore Size (mm)	Hub Width (mm)	Rim Width (mm)	"C" Nominal Hub Outside Diameter (mm)	"B" Nominal Tread Diameter (mm)	Material	Approx. Weight (kg)
76.0	51008	6	19.1	33.3	31.8	28.6	52.5	B.S.	0.45
76.0	11310	10	19.1	33.3	31.8	28.6	52.5	B.S.	0.45
102	51044	6	39.9	25.4	22.2	51.0	79.5	B.S.	0.91
102	1189	10	39.9	25.4	22.2	51.0	79.5	B.S.	0.91
124	2026409	16	44.4	31.8	28.6	57.0	103	F.S.	1.63
149	2023136	19	47.6	44.5	41.3	63.5	111	F.S.	2.72
152	51124	10	41.3	28.6	25.4	57.0	125	F.S.	1.81
152	13014	13	41.3	28.6	25.4	57.0	125	F.S.	1.81
178	51437	6	47.6	34.9	19.1	60.5	159	B.S.	2.81
178	3203	10	47.6	34.9	19.1	60.5	159	B.S.	2.81
203	61710	13	46.9	33.3	31.8	62.0	168	F.S.	3.63
203	2023144	13	47.7	44.5	41.3	65.0	160	F.S.	4.54
203	51598	16	47.6	38.1	34.9	62.0	168	F.S.	3.18
203	2023146	16	47.7	44.5	41.3	65.0	160	F.S.	4.54
203	5194	19	47.6	38.1	34.9	62.0	168	F.S.	3.18
203	2023152	19	47.7	44.5	41.3	65.0	160	F.S.	4.54
203	2023466	26	70.0	63.5	60.5	102	133	F.S.	6.8
216	61747	10	46.9	33.3	25.4	70.0	191	D.I.	4.99
251	51918	10	76.0	44.5	28.6	95.5	217	F.S.	6.35
251	2023154	13	47.6	44.5	41.3	65.0	211	F.S.	6.58
251	6040	13	76.0	44.5	28.6	95.5	217	B.S.	6.35
251	5675	16	34.9	38.1	34.9	82.5	216	F.S.	4.31
251	2023169	16	47.6	44.5	41.3	65.0	211	F.S.	6.58
251	2023173	19	47.6	44.5	41.3	65.0	211	F.S.	6.58
251	2023419	22	63.5	58.5	55.5	89.0	206	F.S.	6.8
254	2023784	28	102	63.5	60.5	146	187	F.S.	12.3
305	2023247	16	47.7	44.5	41.3	82.5	257	F.S.	8.15
305	2023234	19	47.7	44.5	41.3	82.5	248	F.S.	8.15
305	52285	19	76.0	44.5	41.3	114	248	R.F.	7.26
305	2026537	19	76.0	55.5	55.5	114	248	R.F.	10.9
305	62283	22	76.0	55.5	55.5	114	260	R.F.	10.9
305	2030845	26	63.5	58.5	55.5	102	238	R.F.	10.9
330	33653	10	63.5	38.1	28.6	89.0	295	R.F.	6.35
330	50704	13	63.5	38.1	28.6	89.0	295	R.F.	6.35
356	*52720	13	108	63.5	34.9	129	321	D.I.	6.8
356	2023249	16	47.7	44.5	41.3	82.5	308	R.F.	9.07
356	4013098	16	63.5	44.5	41.3	114	308	R.F.	14.1
356	4013187	16	60.5	44.5	41.3	114	308	R.F.	13.6
356	4013105	19	63.5	44.5	41.3	114	299	R.F.	14.1
356	4016503	19	82.5	58.5	55.5	140	299	R.F.	15.4
356	2023564	28	70.0	63.5	60.5	114	289	R.F.	12.7
406	4010046	19	108	70.0	63.5	146	340	R.F.	11.3
406	4010126	26	108	70.0	63.5	146	340	R.F.	19.1
457	4010493	22	89.0	58.7	55.5	140	379	R.F.	29
508	*4014024	8	108	70.0	34.9	146	479	R.F.	20.4
508	4010616	19	89.0	58.5	55.5	140	457	R.F.	29.9
508	4010885	19	108	70.0	54.0	165	457	R.F.	36.3
508	4013613	26	95.0	58.5	55.5	140	419	R.F.	34.5
508	4010625	22	89.0	58.5	55.5	140	430	R.F.	33.6

Custom sheaves are available.

McKissick® Plain Bore Sheaves

"A" Nominal Outside Diameter (mm)	Stock Number	Wire Rope Diameter (mm)	"D" Bore Size (mm)	Hub Width (mm)	Rim Width (mm)	"C" Nominal Hub Outside Diameter (mm)	"B" Nominal Tread Diameter (mm)	Material	Approx. Weight (kg)
508	4010901	26	108	70.0	54.0	165	419	R.F.	36.3
610	4012749	14	165	85.5	79.5	203	559	R.F.	67
610	*4014408	16	120	70.0	38.1	165	553	R.F.	54
610	4011385	26	76.0	63.5	60.5	114	537	R.F.	56.7
610	4012785	26	155	73.0	66.5	203	537	R.F.	59
610	4011223	28	114	76.0	70.0	165	510	R.F.	59
610	2029333	28	165	85.5	79.5	203	510	R.F.	60
610	4011410	38	165	85.5	79.5	210	508	R.F.	84.3
762	2026302	22	165	85.5	79.5	203	686	R.F.	84.3
762	2029382	32	200	89.0	79.5	241	670	R.F.	102
914	4012160	28	165	85.5	79.5	210	819	R.F.	154
914	4012730	38	200	89.0	82.5	241	813	R.F.	137
1067	4015844	38	225	92.0	82.5	279	978	R.F.	209
1067	4015853	32	225	92.0	82.5	279	975	R.F.	209
1067	4015719	32	276	92.0	85.5	318	975	R.F.	201
1067	4015719	32	276	92.0	85.5	318	975	R.F.	201

*Without flame hardening.

Custom sheaves are available.

VIDEO PODCAST SERIES

Our experts answer some of your most common safe rigging, lifting, and securement questions in our video podcast series, *Ask the Expert*.

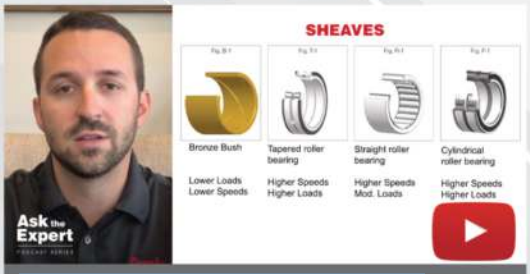
Watch four episodes on sheaves:

- Bronze bushing vs roller bushing
- Understanding groove hardness
- How to know when it's time to replace sheaves
- How to extend the life of a sheave

Ask the Expert

VIDEO PODCAST

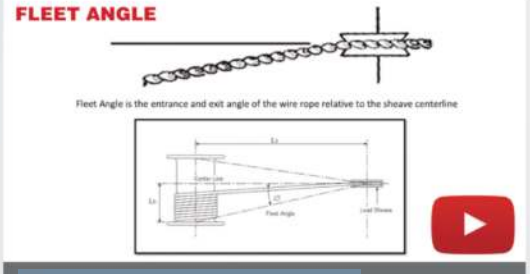
Be sure to subscribe to The Crosby Group's YouTube channel to catch every new video as soon as it's released.



Ep. 27 Sheaves: bronze bushing vs roller bushing

Ep. 32 How to know when it's time to repace sheaves

Ep. 30 Understanding sheave groove hardness



Ep. 34 How to extend the life of a sheave

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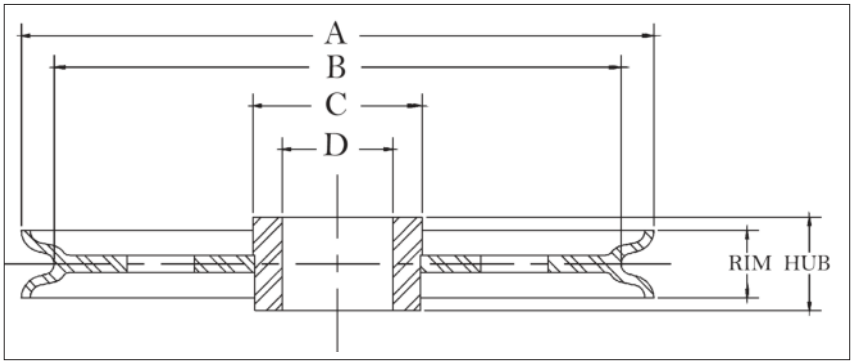


APPLICATION AND WARNING INFORMATION
SECTION 17

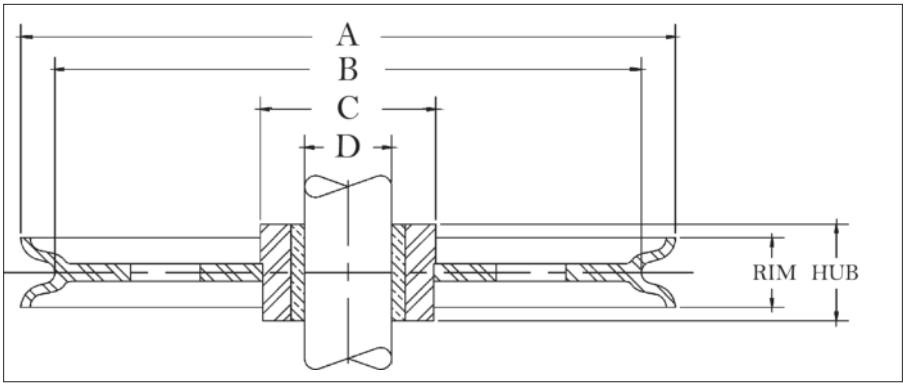
McKissick® Common Bore Sheaves

- Roll-Forged sheaves are available in sizes up to 1981mm diameter.
- Common Bore or Plain Bore are terms used when there is merely a hole bored in the center of the sheave.
- Common Bore Sheaves are machined for a running fit for the shaft size listed, and no bearing or bushing is installed.

"A" Nominal Outside Diameter (mm)	Stock Number	Wire Rope Diameter (mm)	"D" Shaft Size (mm)	Hub Width (mm)	Rim Width (mm)	"C" Nominal Hub Outside Diameter (mm)	"B" Nominal Tread Diameter (mm)	Material	Approx. Weight (kg)
76.0	905051	5	9.55	19.8	19.1	25.4	60.5	P.M.	.45
76.0	905079	5	12.7	19.8	19.1	25.4	60.5	P.M.	.45
76.0	905097	5	15.9	19.8	19.1	25.4	60.5	P.M.	.45
76.0	905024	6	9.55	12.7	12.7	25.4	66.5	P.M.	.34
76.0	905042	6	12.7	12.7	12.7	25.4	66.5	P.M.	.34
102	905122	8	12.7	19.1	15.9	34.9	89.0	P.M.	.45
102	905140	8	15.9	19.1	15.9	34.9	89.0	P.M.	.45
102	905168	10	12.7	20.6	19.1	38.1	82.5	P.M.	.57
102	905202	10	19.1	20.6	19.1	38.1	82.5	P.M.	.57
102	905220	13	12.7	27.0	25.4	41.3	81.0	P.M.	.68
102	905248	13	15.9	27.0	25.4	41.3	81.0	P.M.	.68
127	905293	5	19.1	23.8	22.2	57.0	108	P.M.	1.02
127	905300	10	19.1	23.8	22.2	57.0	108	P.M.	1.02
127	905328	13	15.9	27.0	25.4	57.0	102	P.M.	1.13
152	905426	10	12.7	20.6	19.1	47.6	127	D.I.	1.13
152	905480	10	12.7	27.0	25.4	47.6	127	D.I.	1.13
152	905462	10	15.9	20.6	19.1	47.6	127	P.M.	1.13
152	905523	10	19.1	27.0	25.4	47.6	127	P.M.	1.89
171	905701	10	19.1	30.2	28.6	51.0	149	D.I.	2.27
203	905747	13	19.1	28.6	25.4	60.5	175	D.I.	2.27
203	905783	13	25.4	28.6	25.4	60.5	175	D.I.	3.86
203	905809	16	19.1	34.9	31.8	51.0	165	D.I.	2.72
203	905845	16	25.4	34.9	31.8	51.0	165	D.I.	3.06
203	909324	16	25.4	34.9	31.8	63.5	168	D.I.	3.86
203	909342	16	28.6	34.9	31.8	63.5	168	D.I.	3.86
203	909360	16	31.8	34.9	31.8	63.5	168	D.I.	3.86
203	909388	16	38.1	34.9	31.8	63.5	168	D.I.	3.86
254	905943	13	25.4	28.6	25.4	73.0	222	D.I.	4.54
254	906005	16	25.4	34.9	31.8	76.0	216	D.I.	4.20
254	909761	16	38.1	34.9	31.8	76.0	216	D.I.	6.12
305	906041	13	25.4	28.6	25.4	102	270	D.I.	7.48
305	906087	13	31.8	28.6	25.4	102	270	D.I.	7.48
305	906247	22	38.1	51.0	44.5	95.5	254	D.I.	9.19
356	*906283	19	28.6	41.3	38.1	82.5	311	C.I.	12
356	*906309	19	31.8	41.3	38.1	82.5	311	C.I.	12
457	910820	26	51.0	51.0	47.6	102	378	R.F.	28.1

Material: B.S.=Bar Steel, C.I.=Cast Iron, F.S.=Forged Steel, D.I.=Ductile Iron, C.S.=Cast Steel, P.M.=Powdered Metal, R.F.=Roll-Forged.
*Without flame hardening groove.

Custom sheaves are available.



APPLICATION AND WARNING INFORMATION
SECTION 17

McKissick® Bronze Bushed Sheaves

- Roll-Forged sheaves are available in sizes up to 1981mm diameter.
- McKissick® Bronze Bushed Sheaves are equipped with S.A.E. 660 Bronze Bushings for cold finished shafts with "Figure 8" oil groove, or self-lubricating Bronze as designated by an asterisk (*) next to the shaft size.
- For sizes not listed, McKissick® Finished Bore Sheaves can be equipped with bronze bushings at an optional charge.
- Bronze Bushed Sheaves are designed to operate on shafts machined to +.000/-.002 in of the indicated shaft size.

"A" Nominal Outside Diameter (mm)	Stock Number	Wire Rope Diameter (mm)	"D" Shaft Size (mm)	Hub Width (mm)	Rim Width (mm)	"C" Nominal Hub Outside Diameter (mm)	"B" Nominal Tread Diameter (mm)	Material	Approx. Weight (kg)
57.0	907004	6	9.55*	15.9	14.3	19.1	47.6	B.S.	.34
76.0	907077	5	12.7*	19.8	19.1	25.4	60.5	P.M.	.45
76.0	907095	5	15.9*	19.8	19.1	25.4	60.5	P.M.	.45
76.0	907022	6	9.55*	12.7	12.7	25.4	66.5	P.M.	.34
76.0	907040	6	12.7*	12.7	12.7	25.4	66.5	P.M.	.34
76.0	907086	10	12.7*	19.1	19.1	25.4	60.5	P.M.	.45
76.0	916110	10	12.7*	19.8	19.1	38.1	60.5	B.S.	.45
76.0	460156	10	12.7	33.3	30.0	28.6	52.5	B.S.	.45
76.0	907102	10	15.9*	19.1	19.1	25.4	60.5	P.M.	.45
76.0	2030895	10	19.1	25.4	22.2	44.5	57.0	P.M.	.68
102	460290	3	25.4	25.4	22.2	51.0	79.5	B.S.	.91
102	907111	5	12.7*	19.1	15.9	34.9	89.0	P.M.	.45
102	907139	5	15.9*	19.1	15.9	34.9	89.0	P.M.	.45
102	916147	6	12.7*	20.6	19.1	51.0	82.5	B.S.	.68
102	916165	6	19.1*	20.6	19.1	51.0	82.5	B.S.	.68
102	460307	6	25.4	25.4	22.2	51.0	79.5	B.S.	.91
102	907120	8	12.7*	19.1	15.9	34.9	89.0	P.M.	.45
102	907148	8	15.9*	19.1	15.9	34.9	89.0	P.M.	.45
102	907166	10	12.7*	20.6	19.1	38.1	82.5	P.M.	.57
102	916156	10	12.7*	20.6	19.1	51.0	82.5	B.S.	.68
102	907184	10	15.9*	20.6	19.1	38.1	82.5	P.M.	.64
102	907200	10	19.1*	20.6	19.1	38.1	82.5	P.M.	.57
102	460316	10	25.4	25.4	22.2	51.0	79.5	B.S.	.91
102	907228	13	12.7*	27.0	25.4	41.3	81.0	P.M.	.68
102	907246	13	15.9*	27.0	25.4	41.3	81.0	P.M.	.68
102	907264	13	19.1*	27.0	25.4	41.3	81.0	P.M.	.68
105	2023186	10	25.4	38.1	34.9	51.0	76.0	F.S.	1.59
105	2023188	16	25.4	38.1	34.9	51.0	76.0	F.S.	1.59
108	460441	13	15.9*	30.2	23.8	54.0	85.5	B.S.	1.09
124	460478	10	31.8	31.8	28.6	57.0	103	F.S.	1.63
124	460469	16	31.8	31.8	28.6	57.0	103	F.S.	1.63
127	907273	5	15.9*	23.8	22.2	57.0	108	P.M.	1.02
127	460511	8	19.1	25.4	22.2	38.1	102	F.S.	1.13
127	907282	10	15.9*	23.8	22.2	57.0	108	P.M.	1.02
127	907308	10	19.1*	23.8	22.2	57.0	108	P.M.	1.02
127	460520	10	19.1	25.4	22.2	38.1	102	F.S.	1.13
127	907344	13	19.1*	30.2	25.4	57.0	102	P.M.	1.13
133	460637	19	25.4	38.1	34.9	52.5	98.5	F.S.	1.81
149	2023129	16	38.1	44.5	41.3	63.5	111	F.S.	2.72
149	2023137	19	38.1	44.5	41.3	63.5	111	F.S.	2.72
152	907424	10	12.7*	20.6	19.1	47.6	127	P.M.	1.13
152	907488	10	12.7*	27.0	25.4	47.6	127	P.M.	1.13
152	907442	10	15.9*	20.6	19.1	47.6	127	P.M.	1.13
152	907503	10	15.9*	27.0	25.4	47.6	127	P.M.	1.13
152	907460	10	19.1*	20.6	19.1	47.6	127	P.M.	1.13
152	907521	10	19.1*	27.0	25.4	47.6	127	P.M.	1.13
152	2026483	10	19.1*	27.0	25.4	51.0	130	F.S.	1.81

Custom sheaves are available.

McKissick® Bronze Bushed Sheaves

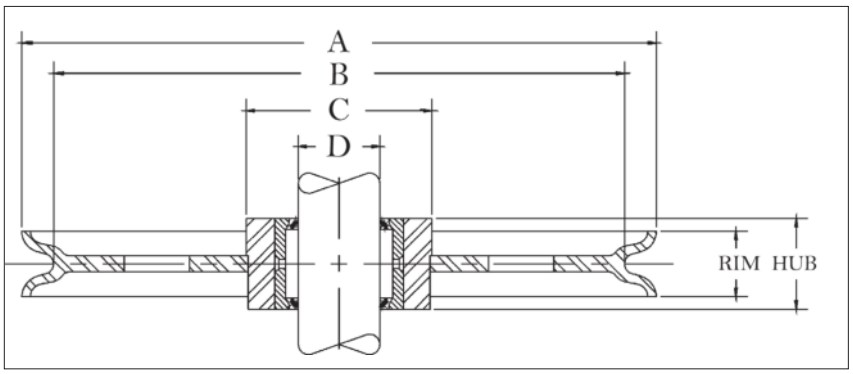
"A" Nominal Outside Diameter (mm)	Stock Number	Wire Rope Diameter (mm)	"D" Shaft Size (mm)	Hub Width (mm)	Rim Width (mm)	"C" Nominal Hub Outside Diameter (mm)	"B" Nominal Tread Diameter (mm)	Material	Approx. Weight (kg)
152	916245	10	22.2*	27.0	25.4	51.0	130	F.S.	1.81
152	2028641	10	25.4*	27.0	25.4	51.0	130	F.S.	1.81
152	460682	10	31.8	28.4	25.4	57.0	125	F.S.	1.68
152	907549	13	15.9*	30.2	28.6	47.6	124	P.M.	2.27
152	907567	13	19.1*	30.2	28.6	47.6	124	P.M.	2.14
152	913024	13	22.2*	27.0	25.4	47.6	124	P.M.	1.70
152	460879	13	25.4	38.1	31.8	79.5	121	B.S.	3.18
152	460673	13	31.8*	28.6	25.4	57.0	125	F.S.	1.81
152	2028048	13	25.4*	27.0	25.4	47.6	124	P.M.	4.31
152	2026938	16	19.1*	27.0	25.4	51.0	130	F.S.	3.18
152	913060	16	19.1*	33.3	31.8	47.6	121	P.M.	1.81
152	913088	16	22.2	33.3	31.8	47.6	121	P.M.	1.70
152	2026822	16	25.4*	27.0	25.4	51.0	130	F.S.	1.81
152	913104	16	25.4*	33.3	31.8	47.6	121	P.M.	1.70
152	2023264	16	51.0	58.5	55.5	79.5	108	F.S.	4.31
152	460897	19	25.4	38.1	31.8	79.5	121	B.S.	3.18
152	913168	19	25.4	39.7	38.1	76.0	117	P.M.	3.06
152	2023260	19	51.0	58.5	55.5	79.5	108	F.S.	4.31
152	2023262	22	51.0	58.5	55.5	79.5	108	F.S.	4.31
171	907692	6	19.1*	30.2	28.6	51.0	149	D.I.	2.27
171	907718	6	25.4*	30.2	28.6	51.0	149	D.I.	2.27
171	907709	10	19.1*	30.2	28.6	51.0	149	D.I.	2.27
171	907727	10	25.4*	30.2	28.6	51.0	149	D.I.	2.27
178	461020	6	38.1	34.9	19.1	60.5	159	B.S.	2.81
178	461039	10	38.1	34.9	19.1	60.5	159	B.S.	2.81
178	907629	13	19.1*	27.0	25.4	51.0	143	D.I.	1.93
191	460986	16	25.4	38.1	34.9	52.5	160	F.S.	3.40
191	460977	19	25.4	38.1	34.9	52.5	160	F.S.	3.40
194	461262	10	25.4	38.1	31.8	60.5	157	D.I.	3.18
194	461280	13	25.4	38.1	31.8	60.5	157	D.I.	3.18
194	461271	16	25.4	38.1	31.8	60.5	157	D.I.	3.18
203	907745	13	19.1*	28.6	25.4	60.5	175	D.I.	2.27
203	916487	13	19.1*	34.9	31.8	51.0	168	F.S.	3.18
203	907763	13	22.2*	28.6	25.4	60.5	175	D.I.	2.27
203	907781	13	25.4*	28.6	25.4	60.5	175	D.I.	2.27
203	916520	13	25.4*	34.9	31.8	51.0	168	F.S.	3.18
203	2026841	13	28.6*	34.9	31.8	51.0	168	F.S.	3.18
203	2026844	13	31.8*	34.9	31.8	51.0	168	F.S.	3.18
203	461235	13	38.1	38.1	34.9	62.0	168	F.S.	3.18
203	2023145	13	38.1	44.5	41.3	65.0	160	F.S.	4.54
203	907807	16	19.1*	34.9	31.8	51.0	165	D.I.	3.06
203	913300	16	22.2*	34.9	31.8	51.0	165	D.I.	3.06
203	913328	16	25.4*	34.9	31.8	63.5	168	D.I.	3.86
203	913364	16	31.8*	34.9	31.8	63.5	168	D.I.	3.86
203	913382	16	38.1*	34.9	31.8	63.5	168	D.I.	3.86
203	461244	16	38.1	38.1	34.9	62.0	168	F.S.	3.18
203	2023147	16	38.1	44.5	41.3	65.0	160	F.S.	4.54
203	461253	19	38.1	38.1	34.9	62.0	168	F.S.	3.18
203	2023153	19	38.1	44.5	41.3	65.0	160	F.S.	4.54
203	2028227	19	51.0	58.5	54.0	82.5	156	F.S.	5.67
203	461397	19	70.0	58.5	55.5	95.5	152	B.S.	4.76
203	2023386	22	51.0	58.5	54.0	82.5	156	F.S.	5.67
203	2023467	26	57.0	63.5	60.3	114	137	F.S.	8.16
203	2023463	28	57.0	63.5	60.3	114	137	F.S.	8.16
251	462831	10	63.5	44.5	28.6	95.0	217	F.S.	6.35
251	462154	13	25.4*	38.1	34.9	82.5	216	F.S.	4.31
251	2023166	13	38.1	44.5	41.3	65.0	211	F.S.	6.58
251	462840	13	63.5	44.5	28.6	95.5	217	F.S.	6.35
251	2023170	16	38.1	44.5	41.3	65.0	211	F.S.	6.58
251	2023174	19	38.1	44.5	41.3	65.0	211	F.S.	6.58
251	2023420	22	51.0	58.5	55.5	89.0	206	F.S.	6.80
251	2023428	25	51.0	58.5	55.5	89.0	206	F.S.	6.80
254	907923	13	22.2*	28.6	25.4	73.0	222	D.I.	4.54
254	907941	13	25.4*	28.6	25.4	73.0	222	D.I.	5.35
254	907969	16	19.1*	34.9	31.8	51.0	216	D.I.	4.20
254	908003	16	25.4*	34.9	31.8	51.0	216	D.I.	4.20
254	916726	16	25.4*	34.9	31.8	70.0	216	F.S.	6.35
254	2027291	16	31.8*	34.9	31.8	70.0	216	F.S.	6.35
254	913765	16	38.1*	34.9	31.8	76.0	216	D.I.	5.72
254	913863	19	38.1*	41.3	38.1	89.0	210	F.S.	7.26

McKissick® Bronze Bushed Sheaves

"A" Nominal Outside Diameter (mm)	Stock Number	Wire Rope Diameter (mm)	"D" Shaft Size (mm)	Hub Width (mm)	Rim Width (mm)	"C" Nominal Hub Outside Diameter (mm)	"B" Nominal Tread Diameter (mm)	Material	Approx. Weight (kg)
254	913845	19	31.8*	41.3	38.1	89.0	210	F.S.	7.26
254	916833	19	38.1*	41.3	38.1	82.5	197	F.S.	7.71
254	913807	19	25.4*	41.3	38.1	89.0	210	F.S.	7.26
254	2026861	28	57.0	63.5	60.5	114	187	F.S.	12.3
254	2023785	28	89.0	63.5	60.5	146	187	F.S.	12.7
302	462323	10	63.5	58.7	25.4	95.5	273	D.I.	5.08
305	908049	13	25.4*	28.6	25.4	102	270	D.I.	7.48
305	908085	13	31.8*	28.6	25.4	102	270	D.I.	7.48
305	917011	16	28.6*	41.3	38.1	82.5	257	F.S.	8.16
305	2023227	16	38.1	44.5	41.3	82.5	260	F.S.	9.98
305	462387	16	51.0*	58.5	55.5	114	257	R.F.	11.8
305	462564	16	63.5	44.5	41.3	114	271	R.F.	10.9
305	908129	19	25.4*	41.3	38.1	70.0	260	D.I.	8.28
305	914149	19	31.8	41.3	38.1	133	260	D.I.	11.6
305	914167	19	38.1	41.3	38.1	133	260	D.I.	11.6
305	2023235	19	38.1	44.5	41.3	82.5	238	F.S.	9.98
305	462449	19	51.0	58.5	55.5	114	248	R.F.	11.8
305	346593	19	57.0	58.5	55.5	114	248	R.F.	11.8
305	462573	19	63.5	44.5	41.3	114	238	R.F.	10.9
305	4104882	19	63.5	44.5	41.3	114	248	R.F.	11.3
305	4104917	19	63.5*	58.5	55.5	114	248	R.F.	11.3
305	462485	19	76.0*	76.0	47.6	140	238	R.F.	9.53
305	908245	22	38.1	51.0	44.5	95.5	254	D.I.	9.19
305	462458	22	51.0	58.5	55.5	114	260	R.F.	11.8
305	2023554	22	57.0	63.5	60.5	114	238	R.F.	12.7
305	4104891	22	63.5	44.5	41.3	114	260	R.F.	11.3
305	462467	25	51.0	58.5	55.5	102	254	R.F.	11.8
330	462779	10	51.0	38.1	28.6	89.0	295	R.F.	6.35
330	462788	13	51.0	38.1	28.6	89.0	295	R.F.	6.35
356	**463518	13	95.5*	63.5	34.9	114	321	R.F.	6.8
356	463625	16	38.1	44.5	41.3	89.0	308	R.F.	9.07
356	4103552	16	51.0*	44.5	41.3	129	308	R.F.	13.2
356	**908281	19	28.6*	41.3	36.3	114	311	C.I.	12
356	**908307	19	31.8*	41.3	38.1	82.5	311	C.I.	12
356	917173	19	31.8	41.3	38.1	82.5	305	R.F.	12.0
356	917191	19	38.1	41.3	38.1	102	298	R.F.	12.0
356	463634	19	38.1	44.5	41.3	82.5	289	R.F.	9.07
356	4103632	19	51.0*	44.5	41.3	82.5	298	R.F.	13.6
356	4104828	19	70.0*	58.5	55.5	114	298	R.F.	15.9
356	4103641	22	51.0	44.5	41.3	114	311	R.F.	14.1
356	463466	28	57.0	63.5	60.5	114	289	R.F.	12.7
406	4101395	13	89.0	70.0	63.5	146	362	R.F.	24.5
406	4100047	19	89.0	70.0	63.5	146	340	R.F.	21.3
406	4100109	19	95.5	70.0	63.5	146	340	R.F.	19.1
406	4103703	22	63.5*	58.5	55.5	114	329	R.F.	15.9
406	4105211	22	70.0*	58.5	55.5	114	329	R.F.	19.1
406	917360	25	38.1*	51.0	44.5	108	337	R.F.	15.4
406	4100127	25	95.5	70.0	63.5	146	337	R.F.	28.6
457	4105131	22	76.0*	58.5	55.5	140	379	R.F.	23.6
457	917486	26	51.0*	51.0	47.6	114	378	R.F.	25.0
457	4104052	26	70.0	58.5	55.5	140	378	R.F.	29.9
457	4105140	26	76.0	58.5	55.5	140	378	R.F.	23.6
508	4100341	19	76.0	58.5	55.5	140	457	R.F.	30.8
508	4105239	19	95.5	70.0	54.0	165	457	R.F.	30.8
508	4100350	22	76.0	58.5	55.5	140	435	R.F.	20.4
508	4100369	26	76.0	58.5	55.5	140	435	R.F.	36.4
508	4105257	26	95.5	70.0	54.0	165	419	R.F.	30.8
508	4105275	26	140	73.0	66.5	203	435	R.F.	30.8
610	4105355	22	146	85.5	79.5	203	533	R.F.	60.3
610	4105382	26	140	73.0	66.5	203	537	R.F.	59.0
610	4100868	28	102	76.0	70.0	165	510	R.F.	49.9
610	4105391	28	140	73.0	66.5	203	510	R.F.	60.8
610	4105373	28	146	85.5	79.5	203	510	R.F.	62.1
762	4105426	22	146	85.5	79.5	203	686	R.F.	92.1
762	4105435	26	146	85.5	79.5	203	686	R.F.	92.1
762	4105444	28	146	85.5	79.5	203	686	R.F.	92.1
762	4105462	28	178	89.0	79.5	241	670	R.F.	95.7
762	4105471	28	178	89.0	79.5	241	670	R.F.	95.7

* * Without Flame Harden groove.

Material: B.S.=Bar Steel, C.I.=Cast Iron, F.S.=Forged Steel, D.I.=Ductile Iron, C.S.=Cast Steel, P.M.=Powdered Metal, R.F.=Roll-Forged.



APPLICATION AND WARNING INFORMATION
SECTION 17

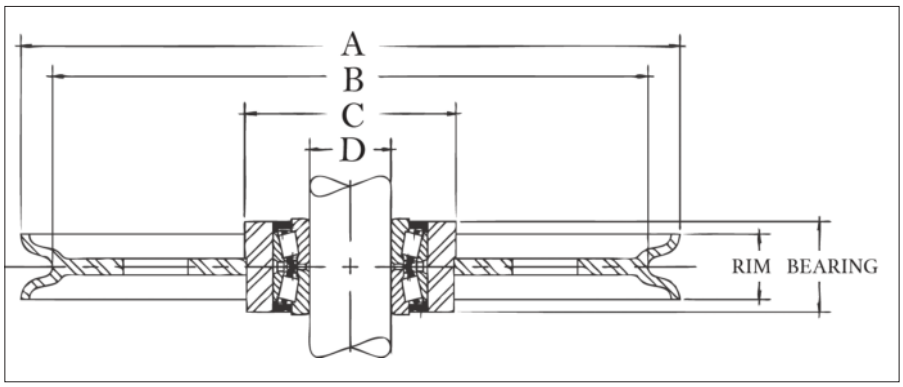
McKissick® Roller Bearing Sheaves

- Roll-Forged sheaves are available in sizes up to 1981mm diameter.
- McKissick® Roller Bearing Sheaves are designed to operate on shafts carborized to 60 Rockwell C and grind to -.003/-.004 of the indicated shaft size. Some sizes are available with an optional inner race. Check with Crosby Sales for prices and correct shaft size.
- Application should provide for79mm running clearance over the hub width.
- For sizes not listed, McKissick® Finished Bore Sheaves can be equipped with Roller Bearings at an optional charge.

"A" Nominal Outside Diameter (mm)	Stock Number	Wire Rope Diameter (mm)	"D" Shaft Size (mm)	Hub Width (mm)	Rim Width (mm)	"C" Nominal Hub Outside Diameter (mm)	"B" Nominal Tread Diameter (mm)	Material	Approx. Weight (kg)
102	472508	3	25.3	25.4	22.2	51.0	79.5	B.S.	.91
102	472517	6	25.3	25.4	22.2	51.0	79.5	B.S.	.91
102	472535	10	25.3	25.4	22.2	51.0	79.5	B.S.	.91
102	2028063	13	25.3	38.1	34.9	51.0	76.0	F.S.	1.59
102	2025891	16	25.3	38.1	34.9	51.0	76.0	F.S.	1.59
124	472768	10	31.7	31.8	28.6	57.0	103	F.S.	1.63
124	472777	13	31.7	31.8	28.6	57.0	103	F.S.	1.63
124	472786	16	31.7	31.8	28.6	57.0	103	F.S.	1.63
133	2026427	16	25.3	38.1	34.9	52.5	98.5	F.S.	1.81
133	2026423	19	25.3	38.1	34.9	52.5	98.5	F.S.	1.81
149	2023141	16	38.0	44.5	41.3	63.5	111	F.S.	2.72
149	2023143	19	38.0	44.5	41.3	63.5	111	F.S.	2.72
152	472875	13	50.5	44.5	31.8	79.5	121	F.S.	3.18
191	2025892	19	25.3	38.1	34.9	52.5	160	F.S.	3.40
194	473311	10	25.3	38.1	31.8	50.5	157	D.I.	3.18
194	473320	13	25.3	38.1	31.8	60.5	157	D.I.	3.18
194	473339	16	25.3	38.1	31.8	60.5	157	D.I.	3.18
203	2023155	13	38.0	44.5	41.3	65.0	160	F.S.	4.54
203	2023159	16	38.0	44.5	41.3	65.0	160	F.S.	4.54
203	2023163	19	38.0	44.5	41.3	65.0	160	F.S.	4.54
203	2023404	19	50.5	58.5	54.0	82.5	156	F.S.	5.67
251	2026433	13	38.0	44.5	41.3	65.0	211	F.S.	6.58
251	2023179	16	38.0	44.5	41.3	65.0	211	F.S.	6.58
251	2023181	19	38.0	44.5	41.3	65.0	211	F.S.	6.58
251	2023436	19	50.5	58.5	55.6	89.0	206	F.S.	6.80
305	2023248	16	38.0	44.5	41.3	82.5	257	F.S.	8.16
305	474365	16	57.0	44.5	41.3	114	257	R.F.	7.26
305	2023236	19	38.0	44.5	41.3	82.5	248	F.S.	8.16
305	474374	19	57.0	44.5	41.3	114	248	R.F.	7.26
356	2026445	16	38.0	44.5	41.3	82.5	305	R.F.	9.07
356	4200563	16	50.5	44.5	41.3	114	308	R.F.	14.1
356	4200572	19	50.5	44.5	41.3	114	298	R.F.	14.1
356	474784	22	38.0	44.5	41.3	82.5	311	R.F.	9.07
406	4200705	22	63.5	58.5	55.5	114	329	R.F.	21.7
457	4201438	22	70.0	58.5	55.5	140	379	R.F.	19.4
457	4200867	25	70.0	58.5	55.5	140	378	R.F.	29.9

* Without flame harden groove
Material: B.S.=Bar Steel, C.I.=Cast Iron, F.S.=Forged Steel, D.I.=Ductile Iron, C.S.=Cast Steel, P.M.=Powdered Metal, R.F.=Roll-Forged.

Custom sheaves are available.



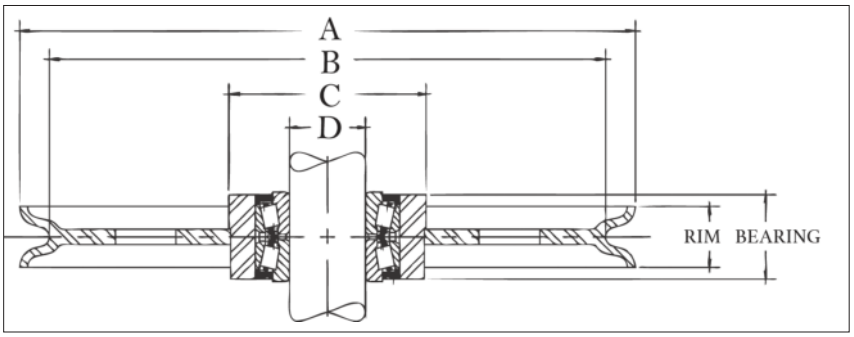
APPLICATION AND WARNING INFORMATION
SECTION 17

McKissick® Tapered Bearing Sheaves

- Roll-Forged sheaves are available in sizes up to 1981mm diameter.
- Tapered Bearing Sheaves are designed to operate on shafts machined to, and no bearing or bushing is installed.
- Applications should provide for tightening separator plates against bearing cones to adjust and insure proper function of bearing.

"A" Nominal Outside Diameter (mm)	Stock Number	Wire Rope Diameter (mm)	"D" Shaft Size (mm)	Bearing Width (mm)	Rim Width (mm)	"C" Nominal Hub Outside Diameter (mm)	"B" Nominal Tread Diameter (mm)	Material	Approx. Weight (kg)
124	480269	10	19.0	1.375	28.6	57.0	103	F.S.	1.63
178	480777	6	19.0	1.375	19.1	60.5	159	B.S.	4.08
203	481017	13	19.0	1.375	31.8	62.0	168	F.S.	3.18
216	481044	10	19.0	1.375	25.4	70.0	191	D.I.	3.40
305	481455	19	38.1	2.313	55.5	114	248	R.F.	10.9
305	481446	22	38.1	2.313	55.5	114	260	R.F.	10.9
406	4302793	13	51.0	2.938	63.5	146	362	R.F.	22.7
406	4300599	19	51.0	2.938	63.5	146	340	R.F.	24.9
406	4300018	22	38.1	2.313	55.5	114	329	R.F.	16.8
406	4300054	26	51.0	2.938	63.5	146	340	R.F.	19.1
457	4300081	19	51.0	2.938	55.5	165	406	R.F.	18.1
508	4300161	19	51.0	2.938	54.0	165	457	R.F.	39.5
508	4300189	26	51.0	2.938	54.0	165	419	R.F.	38.1
610	*4302720	16	70.0	2.938	38.1	165	552	R.F.	62
610	4300312	22	108	3.500	79.5	203	530	R.F.	57.0
610	4300321	26	108	3.500	79.5	194	537	R.F.	57.0
610	4300401	28	70.0	2.938	70.0	165	510	R.F.	36.0
610	4300330	28	108	3.500	79.5	203	510	R.F.	57.0
762	4300483	22	108	3.500	79.5	203	686	R.F.	64.0
762	4300492	26	108	3.500	79.5	194	686	R.F.	95.0
762	4300526	26	143	3.688	79.5	241	686	R.F.	86.0
762	4300508	28	108	3.500	79.5	203	686	R.F.	64.0
762	4300704	32	143	3.688	79.5	241	670	R.F.	64.0

Custom sheaves are available.



APPLICATION AND WARNING INFORMATION
SECTION 17

McKissick® Plain Bore Oilfield Sheaves for Tapered Bearings

- Roll-Forged sheaves are available in sizes up to 1981mm diameter.
- Applications should provide for tightening separator plates against bearing cones to adjust and insure proper function of bearing.
- Each sheave in the table below has a machined bore sized to accept the respective bearing number shown.
- The sheaves are provided from the factory plain bore (the bearings are not included).

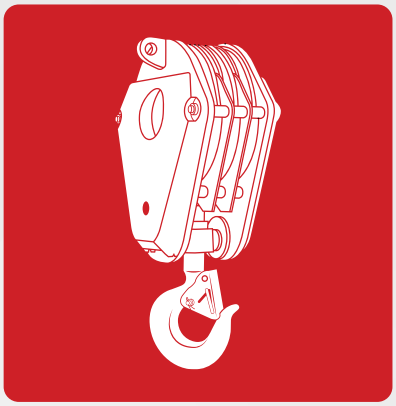
"A" Nominal Outside Diameter (mm)	Stock Number	Wire Rope Diameter (mm)	Bore Information			Bearing Width (mm)	Rim Width (mm)	"C" Nominal Hub Outside Diameter (mm)	"B" Tread Diameter (mm)	Material	Approx. Weight (kg)
			"D" Bore Diameter (mm)	Bearing Info. (Bearing not Included) Shaft Diameter (mm)	Bearing Description						
508	2030311	14	120	70	NA-483-SW-472-D	2.750	70.0	165	448	R.F.	36.3
508	2029285	16	120	70	NA-483-SW-472-D	2.750	70.0	165	452	R.F.	34.0
610	2030941	14	165	108	NA56425-SW-56650D	3.375	79.4	203	549	R.F.	46.7
610	2030905	16	165	108	NA56425-SW-56650D	3.375	76.2	203	559	R.F.	53.1
610	2027885	14	165	108	NA56425-SW-56650D	3.375	79.4	203	549	R.F.	40.8
610	2027887	16	165	108	NA56425-SW-56650D	3.375	69.9	229	559	R.F.	36.3
610	2027880	22	165	108	NA56425-SW-56650D	3.375	79.4	216	532	R.F.	56.7
610	2023993	26	165	108	NA56425-SW-56650D	3.375	79.4	229	536	R.F.	49.9
762	2026299	26	165	108	NA56425-SW-56650D	3.375	79.4	260	673	R.F.	86.2
762	2026036	28	165	108	NA56425-SW-56650D	3.375	79.4	260	662	R.F.	104
762	2026230	26	200	143	NA48685-SW/48620	3.500	79.4	260	573	R.F.	116
762	2026003	28	200	143	NA48685-SW/48620	3.500	79.4	305	662	R.F.	116
762	2030906	26	225	165	NA46790-SW-46720	3.625	85.7	229	673	R.F.	83.9
762	2030907	28	225	165	NA46790-SW-46720	3.625	85.7	229	662	R.F.	120
762	2027941	26	165	108	NA56425-SW-56650D	3.375	79.4	260	673	R.F.	68.0
762	2027945	28	165	108	NA56425-SW-56650D	3.375	79.4	260	662	R.F.	90.7
762	2030274	26	200	143	NA48685-SW/48620	3.500	79.4	260	673	R.F.	73.0
762	2030260	28	200	143	NA48685-SW/48620	3.500	79.4	260	662	R.F.	98.9
917	2030942	26	200	143	NA48685-SW/48620	3.500	82.6	292	841	R.F.	159
917	2030908	28	200	143	NA48685-SW/48620	3.500	82.6	279	854	R.F.	159
917	2030943	26	225	165	NA46790-SW-46720	3.625	79.4	356	841	R.F.	160
917	2029390	28	225	165	NA46790-SW-46720	3.625	82.6	356	854	R.F.	136
917	2029392	32	225	165	NA46790-SW-46720	3.625	82.6	356	819	R.F.	136
917	2030944	26	276	203	LM241149NW/241110-D	3.625	79.4	260	841	R.F.	168
917	2030909	28	276	203	LM241149NW/241110-D	3.625	88.9	260	814	R.F.	162
917	2030945	32	276	203	LM241149NW/241110-D	3.625	85.7	305	819	R.F.	150
917	2030282	26	200	143	NA48685-SW/48620	3.500	82.6	292	841	R.F.	109
917	2030284	28	200	143	NA48685-SW/48620	3.500	82.6	356	829	R.F.	113
1067	2030946	28	225	165	NA46790-SW-46720	3.625	82.6	356	981	R.F.	209
1067	2030947	32	225	165	NA46790-SW-46720	3.625	82.6	406	972	R.F.	213
1067	2030948	28	276	203	LM241149NW/241110-D	3.625	82.6	406	981	R.F.	211
1067	2030949	22	276	203	LM241149NW/241110-D	3.625	82.6	356	972	R.F.	209
1067	2030950	28	327	235	NA8575SW-8520CD	4.500	88.9	356	981	R.F.	211
1067	2030951	32	327	235	NA8575SW-8520CD	4.500	85.7	356	972	R.F.	215
1118	2030952	28	276	203	LM241149NW/241110-D	3.625	85.7	356	1018	R.F.	279
1118	2030953	32	276	203	LM241149NW/241110-D	3.625	76.2	432	1022	R.F.	247
1219	2030954	28	276	203	LM241149NW/241110-D	3.625	82.6	356	1133	R.F.	263
1219	2030955	32	276	203	LM241149NW/241110-D	3.625	69.9	432	1124	R.F.	232
1219	2030956	32	348	251	LM249747NWLM249710D	3.875	82.6	432	1124	R.F.	290
1270	2030938	28	276	203	LM241149NW/241110-D	3.625	85.7	406	1175	R.F.	347
1270	2030957	28	276	251	LM241149NW/241110-D	3.875	82.6	406	1175	R.F.	347
1270	2030958	35	348	251	LM249747NW/LM249710D	3.875	95.3	483	1159	R.F.	333
1397	2030959	28	327	235	NA8575SW-8520CD	4.500	88.9	432	1297	R.F.	404
1397	2030960	32	327	235	NA8575SW-8520CD	4.500	85.7	483	1302	R.F.	374
1397	2030961	32	348	251	LM249747NW/LM249710D	3.875	88.9	483	1302	R.F.	267
1524	2030879	32	348	251	LM249747NW/LM249710D	3.875	82.6	483	1429	R.F.	497
1524	2030880	35	352	267	LM251649NW/251610-D	4.125	92.1	483	1419	R.F.	533
1524	2030881	35	394	305	L357049NW/L357010D	4.125	95.3	483	1419	R.F.	533
1524	2030875	38	348	251	LM249747NW/LM249710D	3.875	88.9	483	1410	R.F.	533

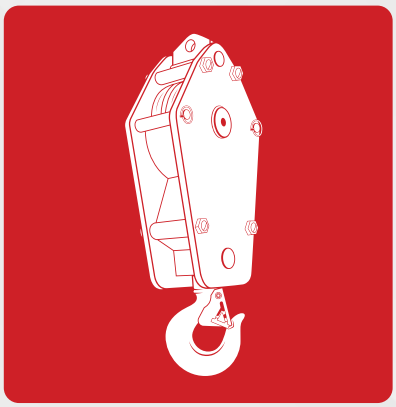
**Crown Sheaves contain lightening holes.

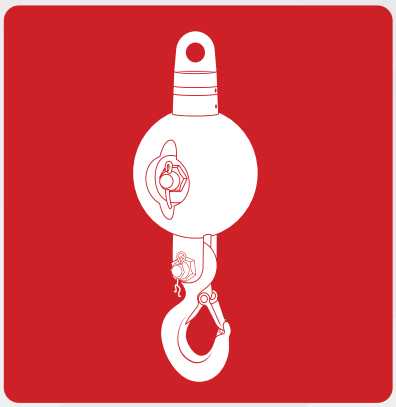
Custom sheaves are available.

BLOCKS

Wide range of blocks and overhaul balls, all made in the USA.







the Crosby group

thecrosbygroup.com

IMPROVE SAFETY & PRODUCTIVITY ON YOUR NEXT LIFT

Wireless cameras & audio-visual warning systems designed specifically for crane blocks & boom tips

- Reduce hazards
- Avoid impacts & collisions
- Confirm load security
- Optimize lifting times
- Improve job site communication
- Return on the bottom line

Unobstructed view of load and surrounding area below

Now available from The Crosby Group:

BlokCam X2

BlokCam M3

BlokAlert

Crosby® | BLOKCAM

See section 2 of this catalog and visit [redacted] for more information.

IMPORTANT CONSIDERATIONS

Some of the most important considerations in your block requirements are:

Available bearing types

Bronze Bushed
SAE 660 bronze with
figure 8 oil groove

Double Row Sealed
Tapered Roller Bearing

Straight Roller
Bearing

Full Complement
Cylindrical Roller Bearing

The sheave

In the image on the right, note the groove form with proper line support and gently rounded lips to prevent line chafing when fleet angles are present.

The sheave cross-section is machined in the image to the right, and the dense martensitic structure is clearly outlined by the etching.

This flame-hardened surface in the wear area of the sheave always presents a smooth, uncorrugated, proper size groove – face to the line. Sheaves 356 mm (14in) diameter and larger are flame hardened in groove to minimum 35 Rockwell C.

Smaller sheaves can be flame hardened on special order.

Unretouched photograph
of a section cut from a flame-
hardened McKissick sheave
(etched 2-1/2 minutes)

Additional connections

All crane and construction blocks casn be furnished with:

Swivel shackle in selected
capacities with bronze thrust
or roller thrust bearing

Single hook in capacities to
300 metric tons

Duplex swivel hook in standard
capacities up to 1,000 metric tons
(larger sizes available)

Quad swivel hook from 200
Metric tons and larger

ORDERING INSTRUCTIONS

The following information should be specified when ordering blocks and sheaves:

Blocks

- Wire rope diameter
- Working Load Limit
- Number of sheaves
- Minimum overhaul weight
- Sheave diameter
- Hook or shackle fittings
- Type of bearing: bronze bushed (BB), roller (RB), tapered roller (TB)

All crane and some construction blocks are available as shown or with swivel shackle assembly, duplex swivel hook assembly, or quadruple hook assembly. Various combinations of bearing assemblies can be furnished, such as bronze bushed sheaves and swivel hooks, roller or tapered roller bearing sheaves and hook assemblies, or a combination of bronze, roller, or tapered roller bearings.

Sheaves

- Wire rope diameter
- Sheave OD
- Shaft or bore size
- Bearing type or blain bore
- Hub width & rim width
- Stock number (if known)
- Special machine features
- Special finishes

If hub or rim dimensions necessitate a dimension other than those shown in this catalog, please contact The Crosby Group for minimums and maximums. Tapered roller bearing sheaves show width over bearing cones, which cannot be altered. Price and delivery for your special needs, if not shown, are available upon request.

McKISSICK

380 Series Hook Blocks

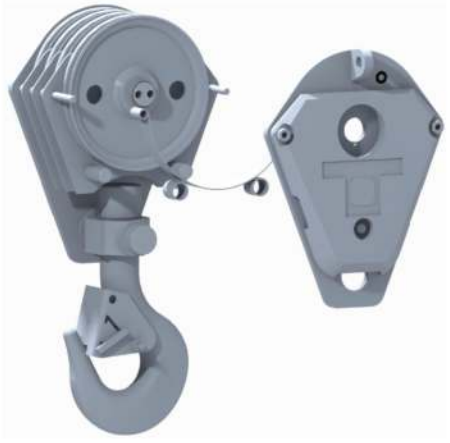
380 Series Hook Blocks

- Wide range of products available:
  - 4.5t to 270t capacity
  - 254mm to 762mm sheave diameter
  - 11mm to 35mm wire rope diameter
  - Larger capacity blocks available
- All 380 Blocks are furnished standard with roller bearings.
- Reeving Guide Standard – all models.
- Blocks through 23 tonnes use 319N style hooks with S-4320 latches.
- Sheaves lubrication through center pin - separate lube channel to each bearing.
- Sheave fully protected by side plates.
- Dual action hook (swings and rotates).
- Repair parts available through worldwide distribution network.
- Design Factor of 4:1 (unless otherwise noted).
- All 380 blocks 406mm and larger are furnished with McKissick® roll-forged sheaves with flame-hardened grooves.
- Marked in short tons unless metric tag requested at time of order.
- Look for the orange hook...the mark of genuine McKissick® quality.

APPLICATION AND WARNING INFORMATION
SECTION 17

OPTIONS AVAILABLE

- Bronze Bushed Sheaves
- Duplex Hooks
- Swivel Tee and Shackle Assemblies
- Sheave Shrouds
- Anti Rotation Hook - Locking Device
- Plate Steel Cheek Weights
- Third party testing with Certification available upon request.



Minimized height, for maximum head-room. Traditional guards/guides facilitate reeving without a fitting.

The patented McKissick® Split-Nut® is the standard retention system for standard crane blocks up to 90 tonnes.

For standard & custom block orders contact our Block Hotline at 800-727-1555 or visit for more information.

McKissick® Utility Crane Blocks

To see the legacy dimensional tables for McKissick® 380 Series Blocks, visit

	SHV OD (mm)	Capacity in metric tons																											
		4.5	9.1	13.6	18.1	22.7	27.2	31.8	36.3	40.8	45.4	49.9	54.4	59.0	63.5	68.0	72.6	81.6	90.7	104.3	113.4	117.9	127.0	136.1	149.7	181.4	204.1	226.8	249.5	272.2
1 SHV	254	■	■	■																									
	305	■	■	■	■																								
	356		■	■	■	■																							
	406		■	■	■	■	■																						
	457				■	■	■	■																					
	508					■	■	■	■																				
	610				■	■	■	■	■	■	■	■																	
2 SHV	254	■	■	■	■																								
	305		■	■	■	■																							
	356		■	■	■	■	■																						
	406			■	■	■	■	■																					
	457					■	■	■	■																				
	508								■	■																			
	610										■	■	■	■	■	■	■												
3 SHV	254		■	■	■	■																							
	305			■	■	■	■																						
	356				■	■	■	■																					
	406					■	■	■	■	■																			
	457					■	■	■	■	■	■	■	■	■	■														
	508						■	■	■	■	■	■	■	■	■	■	■												
	610										■	■	■	■	■	■	■	■	■										
4 SHV	254			■	■	■	■																						
	305				■	■	■	■																					
	356					■	■	■	■	■																			
	406						■	■	■	■	■	■	■	■	■	■	■												
	457								■	■	■	■	■	■	■	■	■	■											
	508										■	■	■	■	■	■	■	■	■										
	610												■	■	■	■	■	■	■	■	■	■	■	■	■				
5 SHV	356							■	■		■	■																	
	406									■	■	■		■	■	■	■	■											
	457											■		■	■	■	■	■	■										
	508												■	■	■	■	■	■	■										
	610													■	■	■	■	■	■	■	■	■	■	■	■	■	■		
	762																									■	■		
6 SHV	356										■	■	■																
	406													■	■	■	■												
	457												■	■	■	■	■	■	■	■	■	■	■						
	508													■	■	■	■	■	■	■	■	■	■	■	■				
	610													■	■	■	■	■	■	■	■	■	■	■	■	■	■		
	762																									■	■	■	■
7 SHV	610																											■	■
8 SHV	762																												■

Review the table above to see all standard configurations available. We have also engineered thousands of special crane blocks, so it is very likely that we have the ideal solution to your rigging application. Visit thecrosbygroup.com/engineeredsolutions to learn more.

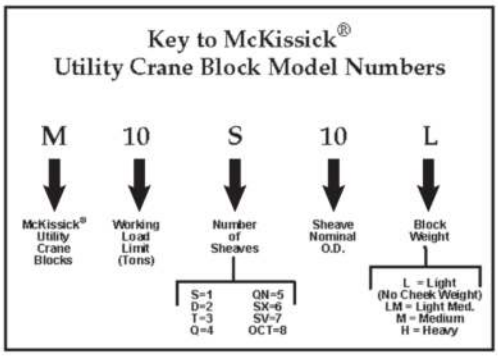


Table 1 - Standard Wireline Sizes For McKissick 380 Utility Crane Blocks

Sheave Diameter (in)	Wireline Size (in)									
	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8
10	■	■	■	■						
12		■	■	■	■					
14		■	■	■	■					
16			■	■	■	■				
18				■	■	■	■			
20					■	■	■	■		
24						■	■	■	■	■
30							■	■	■	■

*For additionnal Wireline sizes, please call Crosby's Special Engineered Poducts Group at 1(800)777-1555.

15

380 Series Easy Reeve® Hook Blocks

380 Series Easy Reeve® Hook Block

- Wide range of products available:
  - 4.5 to 73 tonnes capacity
  - 254 to 508mm sheave diameter
  - 11 to 32mm wire rope diameter
  - Larger capacity blocks available
- All single point shank hooks are genuine Crosby®, forged alloy steel, Quenched & Tempered, and have the patented QUIC-CHECK® markings (Duplex hooks are available on most sizes).
- Design factor of 4:1 (unless otherwise noted).
- All Easy Reeve® Blocks are furnished standard with roller bearings.
- Reeving Guides Standard – All Models.
- Blocks through 23 tonnes use 319N hooks with S-4320 latches.
- Heavy duty positive locking (PL) latch – Models: 27 tonnes and larger.
- Sheave lubrication through center pin - separate lube channel to each bearing.
- Sheaves fully protected by side plates.
- Dual action hook (swings and rotates).
- Repair parts available through worldwide distribution network.
- All Easy Reeve® blocks 406mm and larger are furnished with McKissick® Roll-Forged sheaves with flame hardened grooves.
- Manufactured by an ISO 9001 and API Q1 certified facility.
- Marked in short tons unless metric tag requested at time of order.
- "Look for the Orange Hook...the mark of genuine McKissick® quality".

APPLICATION AND WARNING INFORMATION
SECTION 17

Center "Dead End" to promote better block travel under various reeving configurations.

The patented McKissick® Split-Nut® is the standard retention system for standard crane blocks up to 90 tonnes.

Sheave Guards that open to allow block reeving without removing the rope end fitting.

Flat Bottom side plate for self standing during reeving process.

For standard & custom block orders contact our Block Hotline at: (800) 727-1555 or visit [redacted] for more information.

McKissick® Easy Reeve® Crane Blocks

To see the legacy dimensional tables for McKissick® 380 Series Easy Reeve® Blocks, visit

	SHV OD (mm)	Capacity in metric tons															
		4.5	9.1	13.6	18.1	22.7	27.2	31.8	36.3	40.8	45.4	49.9	54.4	59.0	63.5	68.0	72.6
1 SHV	254	■	■	■	■												
	305			■													
	356		■	■	■												
	406		■	■		■											
	457				■	■	■										
	508						■	■									
	711																
	762																
2 SHV	254		■	■													
	305		■	■	■	■											
	356				■	■	■										
	406																
	457						■	■									
3 SHV	254		■	■													
	305		■	■	■	■											
	356				■	■	■	■	■	■							
	406						■	■	■	■							
	457								■	■	■	■					
	508												■	■	■	■	■
	762																
4 SHV	305				■	■											
	356		■	■	■	■	■	■	■	■							
	406								■	■	■	■					
	457												■	■	■	■	■
5 SHV	356																
	406										■	■					
	457												■	■	■	■	■
	508												■	■	■	■	■

Review the table above to see all standard configurations available. We have also engineered thousands of special crane blocks, so it is very likely that we have the ideal solution to your rigging application. Visit thecrosbygroup.com/engineeredsolutions to learn more.

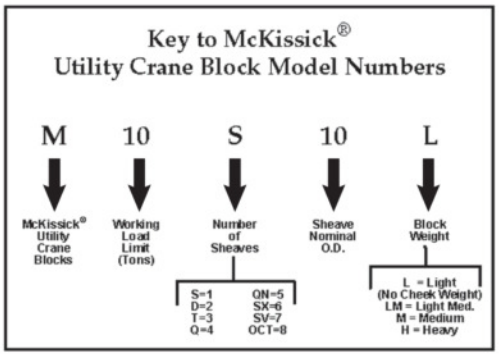


Table 1 - Standard Wireline Sizes For McKissick 380 Utility Crane Blocks

Sheave Diameter (in)	Wireline Size (in)									
	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8
10	■	■	■	■						
12		■	■	■	■					
14		■	■	■	■					
16			■	■	■	■				
18				■	■	■	■			
20					■	■	■	■		
24						■	■	■	■	■
30							■	■	■	■

*For additionnal Wireline sizes, please call Crosby's Special Engineered Poducts Group at 1(800)777-1555.

15

INNOVATIVE RETENTION SYSTEM MAKES INSPECTION EASIER

Crane block hook inspection in four easy steps:

STEP 1
Remove protective vinyl cover

STEP 2
Remove retaining ring

STEP 3
Slide keeper ring off split nuts

STEP 4
Easily remove split nut halves to inspect shank hook

McKissick® Split-Nut® Retention System

Shank hooks on crane blocks must be inspected in accordance with applicable crane standards. These standards mandate the crane hook to be inspected for surface indications, damage, and corrosion, which could compromise the integrity of the crane block.

Because of the type of environments in which these hooks are required to perform, the removal of corroded nuts from the threads can become a problem during inspections.

The innovative, patented* Split-Nut Retention System featured on McKissick crane blocks makes inspection easier. With four easy steps, the hook can be disassembled, inspected and put back into service in a fraction of the time of a conventional threaded nut.

The Split-Nut is standard equipment on McKissick Easy Reeve® crane blocks up to 90 tonnes.

- Allows for easy inspection, as required by ASME B30, CSA Z150, and other crane standards.
- Eliminates conventional threaded nut and problems associated with the nut removal for inspection.
- Allows repeated installation and removal without risk of damage to hook/nut interface.
- Zinc plated finish for corrosion resistance.
- Replacement hook and trunnion assemblies available for selected McKissick 380, or Easy Reeve & 790 blocks with threaded hooks.

The Split-Nut can be purchased in a variety of configurations that can be used to retrofit the following McKissick blocks in the field or in the shop:

- Over 90 tonnes and larger crane blocks (upon request)
- Bridge crane blocks
- 80 Series tubing blocks

In addition, the Split-Nut can be used to replace existing hooks on existing crane blocks currently in the field most manufacturers' makes and models) and on special designed lifting equipment.

McKISSICK®

* US Patent 7,000,905 & 7,293,763

API 2C SYSTEMS

Block systems for offshore pedestal-mounted cranes certified to API 2C are considered critical components. The Crosby Group provides McKissick blocks, overhaul balls, sheaves, button spelter sockets, and wedge sockets that meet the compound requirements of API 2C.

It is the responsibility of the crane manufacturer to license or certify these components.

MCKISSICK® BLOCKS

Material traceability, chemistry reports, tensile test reports, magnetic particle inspection per ASTM E-709 on the following components:

- Hook
- Hook Nut
- Trunnion
- Center Pin
- Side Plate
- Sheave (no MPI on sheave)
- Dead End

Charpy impact test reports per API 2C latest revision on the following components:

- Hook
- Hook Nut
- Trunnion
- Center Pin
- Side Plate
- Dead End

Sheave diameter based on D/d ratio based on pitch equal to a minimum of 18/1.
Weight plates produced from plate steel. Hook to rotate on thrust bearing with grease fitting.
Sheave bearing to be roller bearings with grease fitting. May be proof tested to 2x the rated Working Load Limit.

McKISSICK® OVERHAUL BALLS

Material traceability, chemistry, tensile test, magnetic particle inspection per ASTM E-709 on the following components:

- Swivel Eye
- Fixed Eye Nut
- Swivel Base Plug
- Case Pin
- Hook Pin
- Hook

Charpy impact test reports per API 2C latest revision on the following components:

- Swivel Eye
- Fixed Eye
- Swivel Eye Nut
- Swivel Base Plug
- Case Pin
- Hook Pin
- Hook

Eye to rotate on thrust bearing with grease fitting.
May be proof tested to 2x the rated Working Load Limit.

McKISSICK® WEDGE SOCKETS

421 & 422 up to 32mm

Material traceability, chemistry, tensile test, magnetic particle inspection per ASTM E-709 on the following components:

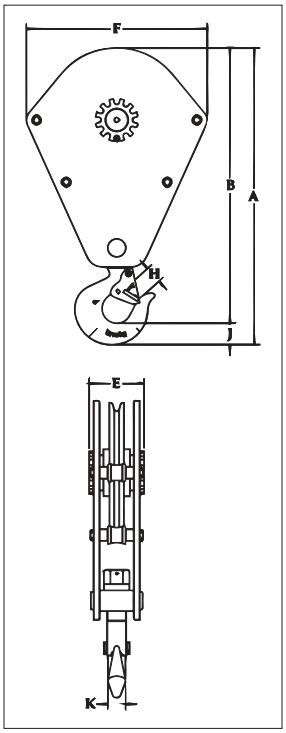
- Socket Body
- Pin

Charpy impact test reports per API 2C latest revision on the following components:

- Socket Body
- Pin

381-SY

- All single point shank hooks are genuine Crosby, forged alloy steel, Quenched & Tempered, and have the patented QUIC-CHECK® markings.
- Durable and allows longer continuous duty cycle.
- Can be used with magnet and drop ball.
- Single sheave design.
- Dual action hook that swings and rotates.
- Utilizes McKissick® roll-forged sheaves with flame-hardened grooves.
- Furnished standard with bronze bushed sheaves.
- Optional tapered roller bearings.
- Marked in short tons unless metric tag requested at time of order.



APPLICATION AND WARNING INFORMATION
SECTION 17

381-SY Scrap Handling Blocks

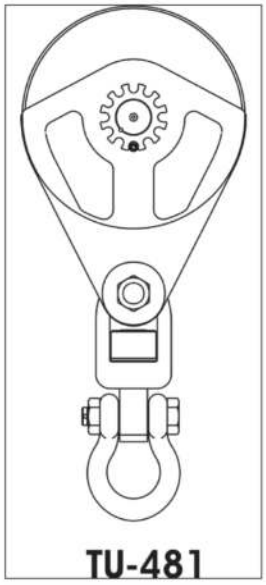
Model No.	Stock No.	Working Load Limit (t)	Sheave Diameter (mm)	Standard Wire Rope Diameters (mm)	Weight Each (kg)	Dimensions (mm)						
						A	B	E	F	H	J	K
S15S16L	2014810	13.5	406	14-22	129	944	868	161	578	70.0	75.5	60.5
S20S18L	2014812	18.0	457	16-25	179	1004	929	174	629	70.0	75.5	60.5
S25S20L	2014814	22.5	508	19-28	209	1071	995	174	679	70.0	75.5	60.5
S30S24L	2014816	27.0	610	22-32	320	1281	1189	199	781	82.5	92.0	76.0
S40S24L	2014818	36.0	610	22-32	370	1418	1289	199	781	86.0	129	82.5

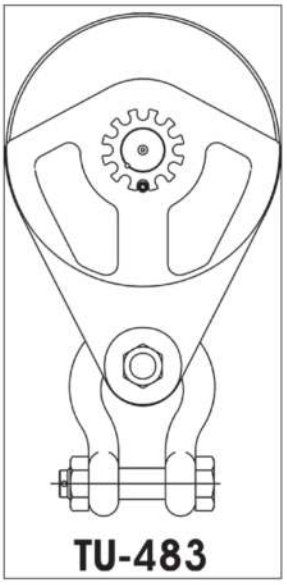
4:1 Design Factor.

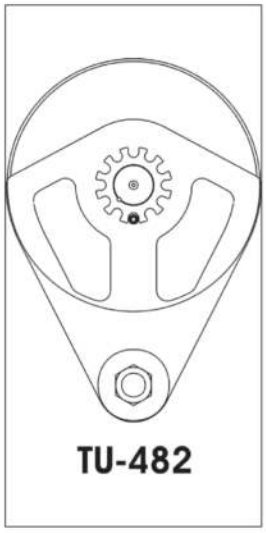
TU-480 Series

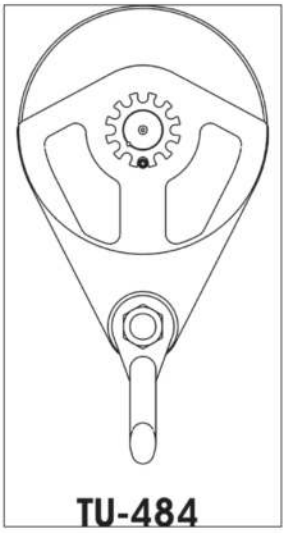
- Wide range of sizes available:
  - 27 and 54 metric tons (30 and 60 short Tons) capacity
  - 25mm to 60mm (1" to 2-1/4") wire rope diameter
  - 406mm to 610mm (16" to 24") sheave diameter
  - Larger capacity blocks available
- Meets or exceeds all requirements of ASME B30.26. Importantly, these blocks meet other critical performance requirements including fatigue life, impact properties and material traceability, not addressed by ASME B30.26.
- Marked in short tons unless metric tag requested at time of order.

APPLICATION AND WARNING INFORMATION
SECTION 17









TU-481 / TU-482 / TU-483 / TU-484
High Capacity Snatch Blocks for Tilt-Up Wall Construction

Working Load Limit (t)	Sheave Diameter (mm)	Wire Rope Diameter (mm)	With Swivel Shackle		Tailboard Style		With Upset Shackle		With Fixed Shackle	
			TU-481 Stock No.	TU-481 Weight Each (kg)	TU-482 Stock No.	TU-482 Weight Each (kg)	TU-483 Stock No.	TU-483 Weight Each (kg)	TU-484 Stock No.	TU-484 Weight Each (kg)
27	406	32	2108327	107	2108330	63.5	2108333	81.6	2108651	72.6
27	406	38	2108351	107	2108354	63.5	2108357	81.6	2108657	72.6
27	508	32	2108387	113	2108390	70.3	2108393	88.5	2108666	79.4
54	508	38	2108411	177	2108414	70.3	2108417	88.5	2108672	79.4
54	457	32	2108453	177	2108456	104	2108459	154	2108462	132
54	457	38	2108483	177	2108486	104	2108489	154	2108492	132
54	610	32	2108528	204	2108531	132	2108534	181	2108537	159
54	610	38	2108558	204	2108561	132	2108564	181	2108567	159
54	610	44	2108588	204	2108591	132	2108594	181	2108597	159
54	610	51	2108618	204	2108621	132	2108624	181	2108627	159
54	610	57	2108633	204	2108636	132	2108639	181	2108642	159

4:1 Design Factor.
Contact our Block Hotline 800-772-1555 or visit [redacted] for more information.

680 Series Construction Blocks

680 Construction Block with shackle

680 Construction Block with hanger

680 Construction Block bolt only

APPLICATION AND WARNING INFORMATION
SECTION 17

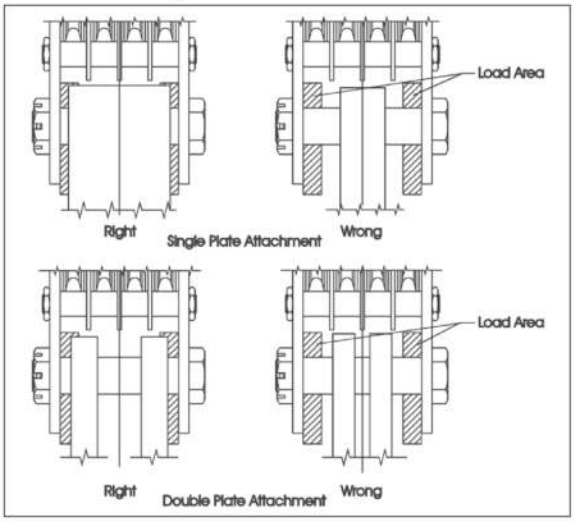
- Wide range of products available:
  - 4.5t to 90t capacity
  - 152mm to 610mm sheave diameter
  - 10mm to 32mm wire rope diameter
  - Larger capacity blocks available
- Equipped with genuine Crosby® forged steel Quenched & Tempered shackles that contain the patented QUIC-CHECK® markings.
- Design Factor of 4:1.
- All 680 Series Blocks are furnished standard with bronze bushings.
- All 680 Series Blocks 406mm and larger, are furnished with McKissick® roll-forged sheaves with flame-hardened grooves.
- Sheaves are lubricated through center pin with a separate lube channel to each bearing.

OPTIONS AVAILABLE

- Roller bearing sheaves
- Hanger and Bolt Only models available
- Third party testing with certification
- Galvanized finish – Most models

- Single sheave blocks have thimble dead end.
- Manufactured by an ISO 9001 and API Q1 Certified facility.
- Marked in short tons unless metric tag requested at time of order.
- Meets or exceeds all requirements of ASME B30.26. Importantly, these blocks meet other critical performance requirements including fatigue life, impact properties and material traceability, not addressed by ASME B30.26.

Block Loading Area



NOTE: The outside of attaching plates must be within the indicated load areas. Means must be provided to keep attaching plates equally spaced from the block side plates. For dimension information, including the load area, visit .

McKissick® Construction Blocks

To see the legacy dimensional tables for McKissick® 680 Series Construction Blocks, visit

	OD (mm)	SHV OD (mm)	Capacity in metric tons																
			4.5	6.8	9.1	13.6	18.1	22.7	27.2	31.8	36.3	40.8	45.4	49.9	54.4	59.0	63.5	72.6	81.6	90.7
1 SHV	3861	152	■	■																
	5156	203	■	■	■															
	6452	254			■	■														
	7747	305			■	■														
	9042	356			■	■														
	11608	457					■	■												
2 SHV	3861	152	■	■	■															
	5156	203	■	■	■															
	6452	254			■	■														
	7747	305			■	■	■	■	■	■										
	9042	356			■	■	■	■	■	■										
	10312	406					■	■	■	■										
	11608	457							■	■	■	■								
	12903	508									■	■	■	■						
	15494	610									■	■	■	■						
3 SHV	3861	152	■	■	■															
	5156	203	■	■	■															
	6452	254			■	■	■	■	■	■										
	7747	305			■	■	■	■	■	■										
	9042	356			■	■	■	■	■	■	■	■								
	10312	406					■	■	■	■	■	■								
	11608	457									■	■	■	■	■	■				
	12903	508									■	■	■	■	■	■	■	■		
	15494	610											■	■	■	■				
4 SHV	5156	203			■		■	■												
	6452	254			■	■	■	■	■	■										
	7747	305					■	■	■	■	■	■								
	9042	356					■	■	■	■	■	■								
	10312	406							■	■	■	■	■	■						
	11608	457									■	■	■	■	■	■				
	12903	508													■	■	■	■	■	
	15494	610													■	■	■	■	■	
5 SHV	12903	508															■	■	■	■
	15494	610															■	■	■	■
6 SHV	12903	508																		■
	15494	610																		■

Review the table above to see all standard configurations available. We have also engineered thousands of special crane blocks, so it is very likely that we have the ideal solution to your rigging application. Visit thecrosbygroup.com/engineeredsolutions to learn more.

Key to McKissick® 680 Construction Block Model Numbers

C	10	D	14	B	(P,H,S)
McKissick Construction Blocks	Working Load Limit (Tons)	Number of Sheaves: S = 1, D = 2, T = 3, Q = 4	Sheave Nominal O.D. (in.)	Bearing Type: B = Bronze Bushed, R = Roller Bearing	Fitting Type: P = Bolt Only, H = with Hanger, S = with Hanger and Shackle

Sheave Diameter (mm)	Wireline Size (mm)									
	10	11	13	14	16	19	22	26	28	32
152	■	■	■							
203	■	■	■							
254		■	■	■	■					
305			■	■	■	■				
356			■	■	■	■				
406				■	■	■	■			
457					■	■	■	■		
508						■	■	■	■	
610							■	■	■	■

15

750 Series Bridge Crane Blocks

- Wide range of products available (see tables below).
- Adjustable sheave spacing in 1/2” increments (1/4” on 6-1/2" size).
- Sheave pitch diameter minimum of 16 times rope diameter on standard sizes.
- All single point shank hooks are genuine Crosby, forged alloy steel, Quenched & Tempered, contain the patented QUIC-CHECK® markings and come with a world class latch that integrates with hook tip.
- Sheave bearings are maintenance free and sealed for life (10,000 hrs).
- Ability to attach optional anti two-block device.
- Available with shackle as lower connection point.
- Design Factor of 5 to 1.

Key to McKissick® Easy-Lift® Overhead Bridge Crane Blocks					
Single and Double Sheave Blocks				Double Sheave Blocks Only	
BC	05	D	08	B	36
McKissick® 750 Series Bridge Crane Blocks	Working Load Limit (t)	Number of Sheaves S = 1 D = 2	Sheave Diameter (in)	Center Pin Designation	Sheave Spacing in 1/8” Increments

APPLICATION AND WARNING INFORMATION
SECTION 17

BC-751
Single Sheave

BC-751 Single Sheave

Model 751 – Single Sheave					
WLL (t)	2	3	5	7.5	10
Sheave O.D.	6.5” 165mm	8” 203mm	10” 254mm	12” 305mm	14” 356mm
Pitch Diameter	5.69” 151mm	7.38” 187mm	9.25” 235mm	11” 279mm	12.5” 318mm
Wire Rope Diameter					
1/4” 6.5mm					
5/16” 8mm					
3/8” 9 - 10mm					
7/16” 11mm					
1/2” 12 - 13mm					
9/16” 14mm					
5/8” 16mm					
3/4” 19mm					
7/8” 22mm					
1” 25 - 26mm					

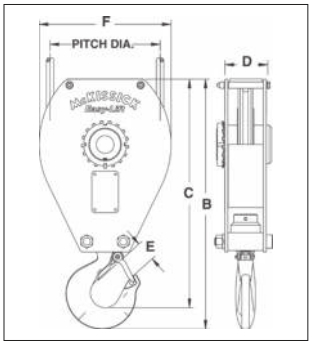
BC-752 Double Sheave

Model 752 – Double Sheave					
WLL (t)	3	5	7.5	10	15
Sheave O.D. (mm)	6.5” 165mm	8” 203mm	10” 254mm	12” 305mm	14” 356mm
Sheave Spacing Centerline (mm)	3.25” - 5” 82.6 - 127mm	4.5” - 6.5” 114 - 165mm	5.25” - 7.75” 133 - 203mm	6.5” - 10” 165 - 254mm	7.5” - 11” 191 - 279mm
Pitch Diameter (mm)	5.95” 150 - 152mm	7.38” 183 - 191mm	9.25” 228 - 236mm	11” 273 - 282mm	11” 273 - 282mm
Wireline*					
1/4” 6.5mm					
5/16” 8mm					
3/8” 9 - 10mm					
7/16” 11mm					
1/2” 12 - 13mm					
9/16” 14mm					
5/8” 16mm					
3/4” 19mm					

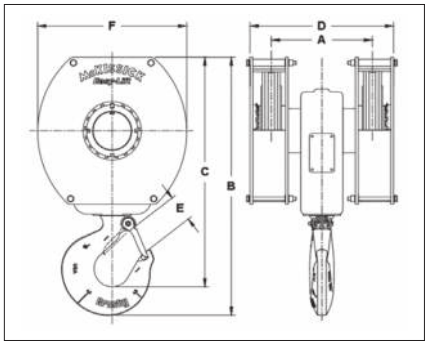
= Primary Wireline Size = Other Wireline Sizes

BC-752
Double Sheave

751 Series



752 Series



751 Series Bridge Crane Blocks

Model No.	Stock No.	Working Load Limit (t)	Sheave Diameter (mm)	Dimensions (mm)					Standard Wire Rope Diameter (mm)	Weight Each (kg)
				B	C	D	E	F		
2 metric tons										
BC02S06	2022539	2	165	354	325	53.8	29.5	189	6	8.2
BC02S06	2022540	2	165	354	325	53.8	29.5	189	8	8.2
BC02S06	2022541	2	165	354	325	53.8	29.5	189	10	8.2
3 metric tons										
BC03S08	2022521	3	203	429	391	69.8	34.5	227	6	16
BC03S08	2022522	3	203	429	391	69.8	34.5	227	8	16
BC03S08	2022523	3	203	429	391	69.8	34.5	227	10	16
BC03S08	2022524	3	203	429	391	69.8	34.5	227	11	16
BC03S08	2022525	3	203	429	391	69.8	34.5	227	13	16
5 metric tons										
BC05S10	2022526	5	254	533	487	88.9	40.9	282	10	27
BC05S10	2022527	5	254	533	487	88.9	40.9	282	11	27
BC05S10	2022528	5	254	533	487	88.9	40.9	282	13	27
BC05S10	2022529	5	254	533	487	88.9	40.9	282	14	27
BC05S10	2022530	5	254	533	487	88.9	40.9	282	16	27
7.5 metric tons										
BC07S12	2022531	7.5	305	646	589	108	52.8	341	13	52
BC07S12	2022532	7.5	305	646	589	108	52.8	341	14	52
BC07S12	2022533	7.5	305	646	589	108	52.8	341	16	52
BC07S12	2022534	7.5	305	646	589	108	52.8	341	19	52
10 metric tons										
BC10S14	2022535	10	356	740	673	127	57.7	394	16	70
BC10S14	2022536	10	356	740	673	127	57.7	394	19	70
BC10S14	2022537	10	356	740	673	127	57.7	394	22	70
BC10S14	2022538	10	356	740	673	127	57.7	394	25	70

5:1 Design Factor.

752 Series Bridge Crane Blocks

Model No.	Stock No.	Working Load Limit (t)	Sheave Diameter (mm)	Dimensions (mm)						Standard Wire Rope Diam. (mm)	Weight Each (kg)
				A	B	C	D	E	F		
3 metric tons											
BC03D06M26	2022731	3	165	82.6	341	304	146	34.5	189	6	16.8
BC03D06M26	2022739	3	165	82.6	341	304	146	34.5	189	8	16.8
BC03D06M26	2022747	3	165	82.6	341	304	146	34.5	189	10	16.8
BC03D06M28	2022732	3	165	88.9	341	304	146	34.5	189	6	16.8
BC03D06M28	2022740	3	165	88.9	341	304	146	34.5	189	8	16.8
BC03D06M28	2022748	3	165	88.9	341	304	146	34.5	189	10	16.8
BC03D06M30	2022733	3	165	95.3	341	304	146	34.5	189	6	16.8
BC03D06M30	2022741	3	165	95.3	341	304	146	34.5	189	8	16.8
BC03D06M30	2022749	3	165	95.3	341	304	146	34.5	189	10	16.8
BC03D06M32	2022734	3	165	102	341	304	146	34.5	189	6	16.8
BC03D06M32	2022742	3	165	102	341	304	146	34.5	189	8	16.8
BC03D06M32	2022750	3	165	102	341	304	146	34.5	189	10	16.8
BC03D06N34	2022735	3	165	108	341	304	171	34.5	189	6	16.8
BC03D06N34	2022743	3	165	108	341	304	171	34.5	189	8	16.8
BC03D06N34	2022751	3	165	108	341	304	171	34.5	189	10	16.8
BC03D06N36	2022736	3	165	114	341	304	171	34.5	189	6	16.8
BC03D06N36	2022744	3	165	114	341	304	171	34.5	189	8	16.8
BC03D06N36	2022752	3	165	114	341	304	171	34.5	189	10	16.8
BC03D06N38	2022737	3	165	121	341	304	171	34.5	189	6	16.8
BC03D06N38	2022745	3	165	121	341	304	171	34.5	189	8	16.8
BC03D06N38	2022753	3	165	121	341	304	171	34.5	189	10	16.8
BC03D06N40	2022738	3	165	127	341	304	171	34.5	189	6	16.8
BC03D06N40	2022746	3	165	127	341	304	171	34.5	189	8	16.8
BC03D06N40	2022754	3	165	127	341	304	171	34.5	189	10	16.8

5:1 Design Factor.

752 Series Bridge Crane Blocks

Model No.	Stock No.	Working Load Limit (t)	Sheave Diameter (mm)	Dimensions (mm)						Standard Wire Rope Diam. (mm)	Weight Each (kg)
				A	B	C	D	E	F		
5 metric tons											
BC05D08B36	2022550	5	203	114	417	371	195	40.9	227	6	34
BC05D08B36	2022551	5	203	114	417	371	195	40.9	227	8	34
BC05D08B36	2022552	5	203	114	417	371	195	40.9	227	10	34
BC05D08B36	2022553	5	203	114	417	371	195	40.9	227	11	34
BC05D08B36	2022554	5	203	114	417	371	195	40.9	227	13	34
BC05D08B40	2022555	5	203	127	417	371	195	40.9	227	6	34
BC05D08B40	2022556	5	203	127	417	371	195	40.9	227	8	34
BC05D08B40	2022557	5	203	127	417	371	195	40.9	227	10	34
BC05D08B40	2022558	5	203	127	417	371	195	40.9	227	11	34
BC05D08B40	2022559	5	203	127	417	371	195	40.9	227	13	34
BC05D08B44	2022560	5	203	140	417	371	195	40.9	227	6	34
BC05D08B44	2022561	5	203	140	417	371	195	40.9	227	8	34
BC05D08B44	2022562	5	203	140	417	371	195	40.9	227	10	34
BC05D08B44	2022563	5	203	140	417	371	195	40.9	227	11	34
BC05D08B44	2022564	5	203	140	417	371	195	40.9	227	13	34
BC05D08C44	2022565	5	203	140	417	371	221	40.9	227	6	34
BC05D08C44	2022566	5	203	140	417	371	221	40.9	227	8	34
BC05D08C44	2022567	5	203	140	417	371	221	40.9	227	10	34
BC05D08C44	2022568	5	203	140	417	371	221	40.9	227	11	34
BC05D08C44	2022569	5	203	140	417	371	221	40.9	227	13	34
BC05D08C48	2022570	5	203	152	417	371	221	40.9	227	6	34
BC05D08C48	2022571	5	203	152	417	371	221	40.9	227	8	34
BC05D08C48	2022572	5	203	152	417	371	221	40.9	227	10	34
BC05D08C48	2022573	5	203	152	417	371	221	40.9	227	11	34
BC05D08C48	2022574	5	203	152	417	371	221	40.9	227	13	34
BC05D08C52	2022575	5	203	165	417	371	221	40.9	227	6	34
BC05D08C52	2022576	5	203	165	417	371	221	40.9	227	8	34
BC05D08C52	2022577	5	203	165	417	371	221	40.9	227	10	34
BC05D08C52	2022578	5	203	165	417	371	221	40.9	227	11	34
BC05D08C52	2022579	5	203	165	417	371	221	40.9	227	13	34
7.5 metric tons											
BC07D10D42	2022580	7.5	254	133	514	457	221	52.8	282	10	57
BC07D10D42	2022581	7.5	254	133	514	457	221	52.8	282	11	57
BC07D10D42	2022582	7.5	254	133	514	457	221	52.8	282	13	57
BC07D10D42	2022583	7.5	254	133	514	457	221	52.8	282	14	57
BC07D10D42	2022584	7.5	254	133	514	457	221	52.8	282	16	57
BC07D10D46	2022585	7.5	254	146	514	457	221	52.8	282	10	57
BC07D10D46	2022586	7.5	254	146	514	457	221	52.8	282	11	57
BC07D10D46	2022587	7.5	254	146	514	457	221	52.8	282	13	57
BC07D10D46	2022588	7.5	254	146	514	457	221	52.8	282	14	57
BC07D10D46	2022589	7.5	254	146	514	457	221	52.8	282	16	57
BC07D10D50	2022590	7.5	254	159	514	457	221	52.8	282	10	57
BC07D10D50	2022591	7.5	254	159	514	457	221	52.8	282	11	57
BC07D10D50	2022592	7.5	254	159	514	457	221	52.8	282	13	57
BC07D10D50	2022593	7.5	254	159	514	457	221	52.8	282	14	57
BC07D10D50	2022594	7.5	254	159	514	457	221	52.8	282	16	57
BC07D10E48	2022595	7.5	254	152	514	457	240	52.8	282	10	57
BC07D10E48	2022596	7.5	254	152	514	457	240	52.8	282	11	57
BC07D10E48	2022597	7.5	254	152	514	457	240	52.8	282	13	57
BC07D10E48	2022598	7.5	254	152	514	457	240	52.8	282	14	57
BC07D10E48	2022599	7.5	254	152	514	457	240	52.8	282	16	57
BC07D10E52	2022600	7.5	254	165	514	457	240	52.8	282	10	57
BC07D10E52	2022601	7.5	254	165	514	457	240	52.8	282	11	57
BC07D10E52	2022602	7.5	254	165	514	457	240	52.8	282	13	57
BC07D10E52	2022603	7.5	254	165	514	457	240	52.8	282	14	57
BC07D10E52	2022604	7.5	254	165	514	457	240	52.8	282	16	57
BC07D10E56	2022605	7.5	254	178	514	457	240	52.8	282	10	57
BC07D10E56	2022606	7.5	254	178	514	457	240	52.8	282	11	57
BC07D10E56	2022607	7.5	254	178	514	457	240	52.8	282	13	57
BC07D10E56	2022608	7.5	254	178	514	457	240	52.8	282	14	57
BC07D10E56	2022609	7.5	254	178	514	457	240	52.8	282	16	57
BC07D10F56	2022610	7.5	254	178	514	457	265	52.8	282	10	57
BC07D10F56	2022611	7.5	254	178	514	457	265	52.8	282	11	57
BC07D10F56	2022612	7.5	254	178	514	457	265	52.8	282	13	57
BC07D10F56	2022613	7.5	254	178	514	457	265	52.8	282	14	57
BC07D10F56	2022614	7.5	254	178	514	457	265	52.8	282	16	57
BC07D10F60	2022615	7.5	254	191	514	457	265	52.8	282	10	57
BC07D10F60	2022616	7.5	254	191	514	457	265	52.8	282	11	57
BC07D10F60	2022617	7.5	254	191	514	457	265	52.8	282	13	57
BC07D10F60	2022618	7.5	254	191	514	457	265	52.8	282	14	57
BC07D10F60	2022619	7.5	254	191	514	457	265	52.8	282	16	57

5:1 Design Factor.

752 Series Bridge Crane Blocks

Model No.	Stock No.	Working Load Limit (t)	Sheave Diameter (mm)	Dimensions (mm)						Standard Wire Rope Diam. (mm)	Weight Each (kg)
				A	B	C	D	E	F		
BC07D10F64	2022620	7.5	254	203	514	457	265	52.8	282	10	57
BC07D10F64	2022621	7.5	254	203	514	457	265	52.8	282	11	57
BC07D10F64	2022622	7.5	254	203	514	457	265	52.8	282	13	57
BC07D10F64	2022623	7.5	254	203	514	457	265	52.8	282	14	57
BC07D10F64	2022624	7.5	254	203	514	457	265	52.8	282	16	57
10 metric tons											
BC10D12G52	2022625	10	305	165	590	524	278	57.7	342	13	109
BC10D12G52	2022626	10	305	165	590	524	278	57.7	342	14	109
BC10D12G52	2022627	10	305	165	590	524	278	57.7	342	16	109
BC10D12G52	2022628	10	305	165	590	524	278	57.7	342	19	109
BC10D12G56	2022629	10	305	178	590	524	278	57.7	342	13	109
BC10D12G56	2022630	10	305	178	590	524	278	57.7	342	14	109
BC10D12G56	2022631	10	305	178	590	524	278	57.7	342	16	109
BC10D12G56	2022632	10	305	178	590	524	278	57.7	342	19	109
BC10D12G60	2022633	10	305	191	590	524	278	57.7	342	13	109
BC10D12G60	2022634	10	305	191	590	524	278	57.7	342	14	109
BC10D12G60	2022635	10	305	191	590	524	278	57.7	342	16	109
BC10D12G60	2022636	10	305	191	590	524	278	57.7	342	19	109
BC10D12G64	2022637	10	305	203	590	524	278	57.7	342	13	109
BC10D12G64	2022638	10	305	203	590	524	278	57.7	342	14	109
BC10D12G64	2022639	10	305	203	590	524	278	57.7	342	16	109
BC10D12G64	2022640	10	305	203	590	524	278	57.7	342	19	109
BC10D12I68	2022657	10	305	216	590	524	329	57.7	342	13	109
BC10D12I68	2022658	10	305	216	590	524	329	57.7	342	14	109
BC10D12I68	2022659	10	305	216	590	524	329	57.7	342	16	109
BC10D12I68	2022660	10	305	216	590	524	329	57.7	342	19	109
BC10D12I72	2022661	10	305	229	590	524	329	57.7	342	13	109
BC10D12I72	2022662	10	305	229	590	524	329	57.7	342	14	109
BC10D12I72	2022663	10	305	229	590	524	329	57.7	342	16	109
BC10D12I72	2022664	10	305	229	590	524	329	57.7	342	19	109
BC10D12I76	2022665	10	305	241	590	524	329	57.7	342	13	109
BC10D12I76	2022666	10	305	241	590	524	329	57.7	342	14	109
BC10D12I76	2022667	10	305	241	590	524	329	57.7	342	16	109
BC10D12I76	2022668	10	305	241	590	524	329	57.7	342	19	109
BC10D12I80	2022669	10	305	254	590	524	329	57.7	342	13	109
BC10D12I80	2022670	10	305	254	590	524	329	57.7	342	14	109
BC10D12I80	2022671	10	305	254	590	524	329	57.7	342	16	109
BC10D12I80	2022672	10	305	254	590	524	329	57.7	342	19	109
15 metric tons											
BC15D12J60	2022673	15	305	191	645	568	303	76.7	342	13	122
BC15D12J60	2022674	15	305	191	645	568	303	76.7	342	14	122
BC15D12J60	2022675	15	305	191	645	568	303	76.7	342	16	122
BC15D12J60	2022676	15	305	191	645	568	303	76.7	342	19	122
BC15D12J64	2022677	15	305	203	645	568	303	76.7	342	13	122
BC15D12J64	2022678	15	305	203	645	568	303	76.7	342	14	122
BC15D12J64	2022679	15	305	203	645	568	303	76.7	342	16	122
BC15D12J64	2022680	15	305	203	645	568	303	76.7	342	19	122
BC15D12J68	2022681	15	305	216	645	568	303	76.7	342	13	122
BC15D12J68	2022682	15	305	216	645	568	303	76.7	342	14	122
BC15D12J68	2022683	15	305	216	645	568	303	76.7	342	16	122
BC15D12J68	2022684	15	305	216	645	568	303	76.7	342	19	122
BC15D12J72	2022685	15	305	229	645	568	303	76.7	342	13	122
BC15D12J72	2022686	15	305	229	645	568	303	76.7	342	14	122
BC15D12J72	2022687	15	305	229	645	568	303	76.7	342	16	122
BC15D12J72	2022688	15	305	229	645	568	303	76.7	342	19	122
BC15D12L76	2022705	15	305	241	645	568	354	76.7	342	13	122
BC15D12L76	2022706	15	305	241	645	568	354	76.7	342	14	122
BC15D12L76	2022707	15	305	241	645	568	354	76.7	342	16	122
BC15D12L76	2022708	15	305	241	645	568	354	76.7	342	19	122
BC15D12L80	2022709	15	305	254	645	568	354	76.7	342	13	122
BC15D12L80	2022710	15	305	254	645	568	354	76.7	342	14	122
BC15D12L80	2022711	15	305	254	645	568	354	76.7	342	16	122
BC15D12L80	2022712	15	305	254	645	568	354	76.7	342	19	122
BC15D12L84	2022713	15	305	267	645	568	354	76.7	342	13	122
BC15D12L84	2022714	15	305	267	645	568	354	76.7	342	14	122
BC15D12L84	2022715	15	305	267	645	568	354	76.7	342	16	122
BC15D12L84	2022716	15	305	267	645	568	354	76.7	342	19	122
BC15D12L88	2022717	15	305	279	645	568	354	76.7	342	13	122
BC15D12L88	2022718	15	305	279	645	568	354	76.7	342	14	122
BC15D12L88	2022719	15	305	279	645	568	354	76.7	342	16	122
BC15D12L88	2022720	15	305	279	645	568	354	76.7	342	19	122

5:1 Design Factor.

UB-500 Series Top Swiveling Overhaul Balls

With **S320** Eye Hook

With **S1316 A SHUR-LOC®** Eye Hook

Both styles available with optional **McKissick®** Wedge Socket Assembly or S-422 **TERMINATOR** Wedge Socket

UWO 422T TERMINATOR Wedge Only

- Sizes 3.6 tonnes through 27 tonnes are available with Crosby's S1316A positive-locking SHUR-LOC® hook, which may be used for lifting personnel. Meets the intent of OSHA Rule 1926.1431(g)(1)(i)(A) and 1926.1501(g)(4)(iv)(B).
- Design Factor 4:1
- The top swivel design on the UB-500 assures the ball remains stationary if the wireline spins.
- The swivel incorporates a sealed roller thrust bearing together with a grease fitting for easy lubrication.
- Each ball can be equipped with the new McKissick® US-422T Wedge Socket which can be easily adjusted to fit various sizes of wireline by changing the wedge (ensure that correct wedge is used for selected wireline size).
- All hooks used on UB-500 Overhaul Balls (S320, S320N & S1316A) are forged from alloy steel. The S320 and S320N hooks come complete with latches.
- The S320 hook (PL latch) and the S320N hook (S4320 latch), with the proper latch attached, may be used for personnel lifting when secured with proper device (bolt, nut and pin for the PL latch; Cotter pin for the S4320 latch). Meets the intent of OSHA Rule 1926.1431(g)(1)(i)(A) and 1926.1501(g)(4)(iv)(B).

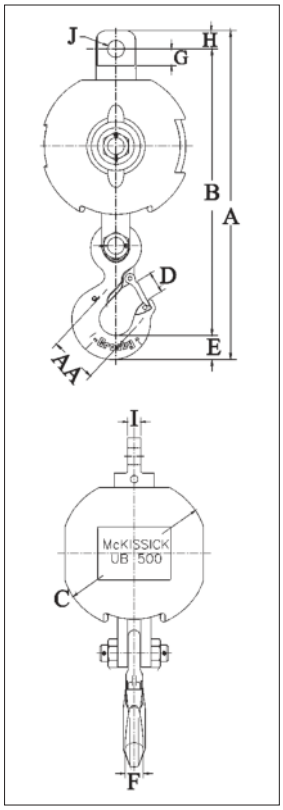
Overhaul Ball Assembly

Optional US-422T Wedge Sockets

McKissick® UB-500 Model No.	UB-500 "E" Eye Hook Stock No.	UB-500 "S" SHUR-LOC® Stock No.	Working Load Limit (t)	Weight Each (kg)	Wireline Size (mm)	Model No.	Wedge Socket Assy. Stock No.	Weight Each (kg)	Wedge Only Stock No.	Weight Each (kg)
MB4T35E	1036000*	1036005	3.6	26.3	10	US4T	1044300	2.09	1047310	2.09
MB4T85E	1036009*	1036018	3.6	46.3	11	US4T	1044309	2.09	1047301	2.09
MB4T150E	1036027*	1036032	3.6	73.5	13	US4T	1044318	2.09	1047329	2.09
MB4T200E	1036036*	1036041	3.6	91.2	13	US5T	1044327	3.86	1047338	3.86
MB7T85E	1036045*	1036050	6.3	49.4	14	US5T	1044336	3.86	1047347	3.86
MB7T150E	1036054*	1036063	6.3	77.1	16	US5T	1044345	3.86	1047356	3.86
MB7T200E	1036072*	1036077	6.3	95.3	16	US6T	1044354	4.26	1047365	4.26
MB7T285E	1036081*	1036086	6.3	146	19	US6T	1044363	4.26	1047374	4.26
MB10T150E	1036090*	1036095	9.0	98						
MB10T200E	1036099*	1036108	9.0	118						
MB10T285E	1036117*	1036122	9.0	166	16	US6T	1044354	4.26	1047365	4.26
MB10T350E	1036126*	1036131	9.0	183	19	US6T	1044363	4.26	1047374	4.26
MB10T650E	1036135*	1036140	9.0	326	22	US8T	1044404	14.3	1047425	14.3
MB12T150E	1036144*	1036520	10.8	98	26	US8T	1044417	14.7	1047431	14.7
MB12T200E	1036153*	1036529	10.8	117	28	US10T	1044426	25.1	1047440	25.1
MB12T285E	1036171*	1036538	10.8	166	32	US10T	1044435	26.3	1047459	26.3
MB12T350E	1036180*	1036547	10.8	183						
MB12T650E	1036189*	1036556	10.8	326						
MB15T200E	1036198*	1036565	13.5	135						
MB15T350E	1036207*	1036574	13.5	207						
MB15T650E	1036216*	1036583	13.5	342						
MB15T1150E	1036225*	1036592	13.5	595						
MB20T200E	1036234*	1036611	18.0	135	16	US8AT	1044372	9.0	1047383	9.0
MB20T350E	1036243*	1036620	18.0	207	19	US8AT	1044381	9.3	1047392	9.3
MB20T650E	1036252*	1036629	18.0	342	22	US8T	1044404	14.3	1047425	14.3
MB20T1150E	1036261*	1036638	18.0	595	26	US8T	1044417	14.7	1047431	14.7
MB25T350E	1036270	1036647	22.5	242	28	US10T	1044426	25.1	1047440	25.1
MB25T650E	1036279	1036656	22.5	392	32	US10T	1044435	26.3	1047459	26.3
MB25T1150E	1036288	1036665	22.5	645						
MB30T650E	1036297	1036674	27.0	392						
MB30T1150E	1036306	1036683	27.0	645						

4:1 Design Factor. * Utilizes Crosby "N" style hooks with integrated latch. Replacement latch kit is S-4320. PL latch and S-4055 latch will not fit. Standard Crosby S-5 Thrust style swivels can not be used with UB-500 Overhaul Balls. For replacement swivels, contact Crosby Customer Service.

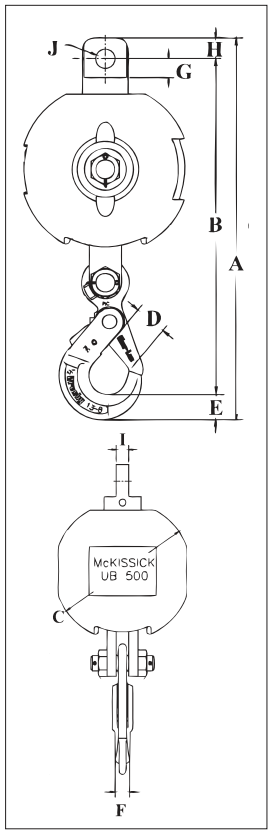
UB-500 TOP SWIVEL OVERHAUL BALLS



UB-500E Top Swivel Overhaul Balls with 320 Eye Hooks

Model No.	UB-500 "E" Stock No.*	Dimensions (mm)										
		A	B	C	D	E	F	G	H	I	J	AA
MB4T35E	1036000*	510	439	191	34.5	36.6	28.4	47.8	35.1	22.4	33.3	63.5
MB4T85E	1036009*	533	461	235	34.5	36.6	28.4	47.8	35.1	22.4	33.3	63.5
MB4T150E	1036027*	558	487	286	34.5	36.6	28.4	47.8	35.1	22.4	33.3	63.5
MB4T200E	1036036*	568	496	318	34.5	36.6	28.4	47.8	35.1	22.4	33.3	63.5
MB7T85E	1036045*	589	517	235	40.9	46.0	35.1	47.8	35.1	22.4	33.3	76.0
MB7T150E	1036054*	624	543	286	40.9	46.0	35.1	47.8	35.1	22.4	33.3	76.0
MB7T200E	1036072*	632	551	318	40.9	46.0	35.1	47.8	35.1	22.4	33.3	76.0
MB7T285E	1036081*	657	576	353	40.9	46.0	35.1	47.8	35.1	22.4	33.3	76.0
MB10T150E	1036090*	799	691	286	53.0	57.0	41.1	70.0	51.0	22.4	45.2	102
MB10T200E	1036099*	808	700	318	53.0	57.0	41.1	70.0	51.0	31.8	45.2	102
MB10T285E	1036117*	832	724	353	53.0	57.0	41.1	70.0	51.0	31.8	45.2	102
MB10T350E	1036126*	846	738	381	53.0	57.0	41.1	70.0	51.0	31.8	45.2	102
MB10T650E	1036135*	884	776	456	53.0	57.0	41.1	70.0	51.0	31.8	45.2	102
MB12T150E	1036144*	799	691	286	53.0	57.0	41.1	70.0	51.0	31.8	45.2	102
MB12T200E	1036153*	808	700	318	53.0	57.0	41.1	70.0	51.0	31.8	45.2	102
MB12T285E	1036171*	832	724	353	53.0	57.0	41.1	70.0	51.0	31.8	45.2	102
MB12T350E	1036180*	846	738	381	53.0	57.0	41.1	70.0	51.0	31.8	45.2	102
MB12T650E	1036189*	909	776	456	53.0	57.0	41.1	70.0	51.0	31.8	45.2	102
MB15T200E	1036198*	955	828	318	76.5	76.0	60.5	60.5	51.0	31.8	45.2	127
MB15T350E	1036207*	986	859	381	76.5	76.0	60.5	60.5	51.0	31.8	45.2	127
MB15T650E	1036216*	1022	895	456	76.5	76.0	60.5	60.5	51.0	31.8	45.2	127
MB15T1150E	1036225*	1072	945	549	76.5	76.0	60.5	60.5	51.0	31.8	45.2	127
MB20T200E	1036234*	955	828	318	76.5	76.0	60.5	60.5	51.0	31.8	45.2	127
MB20T350E	1036243*	986	859	381	76.5	76.0	60.5	60.5	51.0	31.8	45.2	127
MB20T650E	1036252*	1022	895	456	76.5	76.0	60.5	60.5	51.0	31.8	45.2	127
MB20T1150E	1036261*	1072	945	549	76.5	76.0	60.5	60.5	51.0	31.8	45.2	127
MB25T350E	1036270	1198	1021	381	76.0	92.0	76.0	84.0	70.0	44.5	45.2	165
MB25T650E	1036279	1248	1086	456	76.0	92.0	76.0	84.0	70.0	44.5	45.2	165
MB25T1150E	1036288	1297	1135	549	76.0	92.0	76.0	84.0	70.0	44.5	45.2	165
MB30T650E	1036297	1248	1086	456	76.0	92.0	76.0	84.0	70.0	44.5	45.2	165
MB30T1150E	1036306	1297	1135	549	76.0	92.0	76.0	84.0	70.0	44.5	45.2	165

4:1 Design Factor. *3.6 short Ton through 27 short Ton models use Crosby "N" style hooks with integrated latch.



UB-500S Top Swivel Overhaul Balls with SHUR-LOC® Hooks

Model No.	UB-500 "S" Stock No.	Dimensions (mm)									
		A	B	C	D	E	F	G	H	I	J
MB4T35S	1036005	525	462	191	46.5	29.2	23.9	47.8	35.1	22.4	33.3
MB4T85S	1036018	547	484	235	46.5	29.2	23.9	47.8	35.1	22.4	33.3
MB4T150S	1036032	573	509	286	46.5	29.2	23.9	47.8	35.1	22.4	33.3
MB4T200S	1036041	582	519	318	46.5	29.2	23.9	47.8	35.1	22.4	33.3
MB7T85S	1036050	607	541	235	53.5	42.2	29.5	47.8	35.1	22.4	33.3
MB7T150S	1036063	642	566	286	53.5	42.2	29.5	47.8	35.1	22.4	33.3
MB7T200S	1036077	650	575	318	53.5	42.2	29.5	47.8	35.1	22.4	33.3
MB7T285S	1036086	675	600	353	53.5	42.2	29.5	47.8	35.1	22.4	33.3
MB10T150S	1036095	793	691	286	63.0	52.5	38.1	70.0	51.0	31.8	45.2
MB10T200S	1036108	803	700	318	63.0	52.5	38.1	70.0	51.0	31.8	45.2
MB10T285S	1036122	827	724	353	63.0	52.5	38.1	70.0	51.0	31.8	45.2
MB10T350S	1036131	841	738	381	63.0	52.5	38.1	70.0	51.0	31.8	45.2
MB10T650S	1036140	879	776	456	63.0	52.5	38.1	70.0	51.0	31.8	45.2

UB-500 Series Non Swiveling Overhaul Balls

S320
Eye Hook

S1316 A SHUR-LOC®
Eye Hook

Both styles available with optional **McKissick®** Wedge Socket Assembly or S-422 **TERMINATOR** Wedge Socket

UWO 422T
TERMINATOR
Wedge Only

- Sizes 3.6 short Tons through 13.5 short Tons are available with Crosby's S1316A "Positive Locking" SHUR-LOC® hook which may be used for lifting personnel. Meets the intent of OSHA Rule 1926.1431(g)(1)(i)(A) and 1926.1501(g)(4)(iv)(B).
- Design Factor 4:1.
- Each ball can be equipped with the new McKissick® US-422T Wedge Socket which can be easily adjusted to fit various sizes of wireline by changing the wedge.

Key to McKissick® UB-500 Utility Overhaul Ball Model Number

MB	4	T	35	E
McKissick® Utility Overhead Ball	Working Load Limit (Tons)	Swivel Style T = Top NS = Non	Ball Only Weight	Hook Style E = 320 or 320N S = SHUR-LOC® Eye Hook

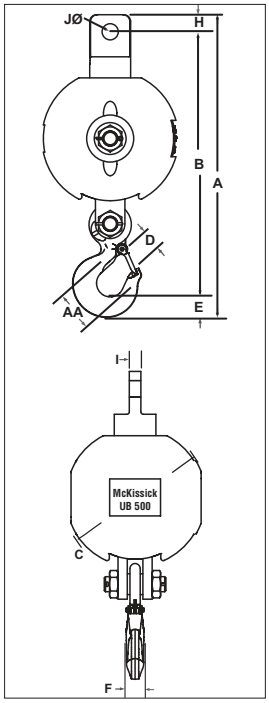
Overhaul Ball Assembly

Optional US-422T Wedge Sockets

McKissick® UB-500 Model No.	UB-500 "E" Eye Hook Stock No.*	UB-500 "S" SHUR-LOC® Stock No.	Working Load Limit (t)	Weight Each (kg)	Wire Rope Diameter (mm)	Model No.	Wedge Socket Assy. Stock No.	Weight Each (kg)	Wedge Only Stock No.	Weight Each (kg)
MB4NS35E	1036402	1036407	3.6	24.5						
MB4NS85E	1036411	1036416	3.6	44.5	10	US4T	1044300	2.09	1047310	2.09
MB4NS150E	1036420	1036425	3.6	71.5	11	US4T	1044309	2.09	1047301	2.09
MB4NS200E	1036429	1036434	3.6	90.7	13	US4T	1044318	2.09	1047329	2.09
MB7NS85E	1036438	1036443	6.3	47.2	13	US5T	1044327	3.86	1047338	3.86
MB7NS150E	1036447	1036452	6.3	74.8	14	US5T	1044336	3.86	1047347	3.86
MB7NS200E	1036456	1036461	6.3	92.9	16	US5T	1044345	3.86	1047356	3.86
MB7NS285E	1036465	1036470	6.3	143	16	US6T	1044354	4.26	1047365	4.26
MB10NS150E	1036474	1036479	9.0	89.8	19	US6T	1044363	4.26	1047374	4.26
MB10NS200E	1036483	1036488	9.0	110						
MB10NS285E	1036492	1036497	9.0	157						
MB10NS350E	1036501	1036506	9.0	175	16	US6T	1044354	4.26	1047365	4.26
MB10NS650E	1036510	1036511	9.0	318	19	US6T	1044363	4.26	1047374	4.26
MB12NS150E	1036519	–	10.8	89.8	22	US8T	1044404	14.3	1047425	14.3
MB12NS200E	1036528	–	10.8	109	26	US8T	1044417	14.7	1047431	14.7
MB12NS285E	1036537	–	10.8	157	28	US10T	1044426	25.1	1047440	25.1
MB12NS350E	1036546	–	10.8	175	32	US10T	1044435	26.3	1047459	26.3
MB12NS650E	1036555	–	10.8	318						
MB15NS200E	1036564	–	13.5	121	16	US8AT	1044372	9.0	1047383	9.0
MB15NS350E	1036573	–	13.5	193	19	US8AT	1044381	9.3	1047392	9.3
MB15NS650E	1036582	–	13.5	327	22	US8T	1044404	14.3	1047425	14.3
MB15NS1150E	1036591	–	13.5	581	26	US8T	1044417	14.7	1047431	14.7
					28	US10T	1044426	25.1	1047440	25.1
					32	US10T	1044435	26.3	1047459	26.3

4:1 Design Factor. *Utilizes Crosby "N" style hooks with integrated latch. Replacement latch kit is S-4320. PL latch and S-4055 latch will not fit.

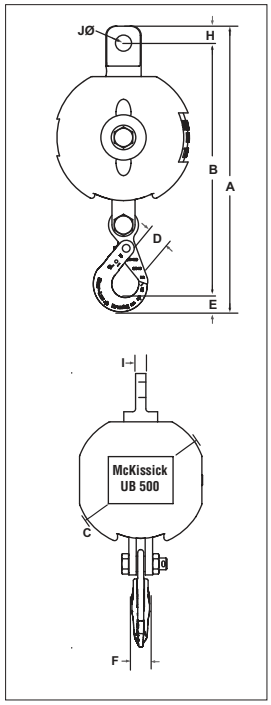
UB-500 NON SWIVEL OVERHAUL BALLS



UB-500NS Non Swivel Overhaul Balls with 320N Eye Hooks

Model No.	UB-500NS "E" Stock No.*	Dimensions (mm)									
		A	B	C	D	E	F	H	I	J	AA
MB4NS35E	1036402	510	439	191	34.5	36.6	28.4	35.1	19.1	33.3	63.5
MB4NS85E	1036411	533	461	235	34.5	36.6	28.4	35.1	19.1	33.3	63.5
MB4NS150E	1036420	558	487	286	34.5	36.6	28.4	35.1	19.1	33.3	63.5
MB4NS200E	1036429	568	496	318	34.5	36.6	28.4	35.1	19.1	33.3	63.5
MB7NS85E	1036438	589	517	235	40.9	46.0	35.1	35.1	19.1	33.3	76.0
MB7NS150E	1036447	624	543	286	40.9	46.0	35.1	35.1	19.1	33.3	76.0
MB7NS200E	1036456	632	551	318	40.9	46.0	35.1	35.1	19.1	33.3	76.0
MB7NS285E	1036465	657	576	353	40.9	46.0	35.1	35.1	19.1	33.3	76.0
MB10NS150E	1036474	799	691	286	53.0	57.0	41.1	51.0	31.8	45.2	102
MB10NS200E	1036483	808	700	318	53.0	57.0	41.1	51.0	31.8	45.2	102
MB10NS285E	1036492	832	724	353	53.0	57.0	41.1	51.0	31.8	45.2	102
MB10NS350E	1036501	846	738	381	53.0	57.0	41.1	51.0	31.8	45.2	102
MB10NS650E	1036510	884	776	456	53.0	57.0	41.1	51.0	31.8	45.2	102
MB12NS150E	1036519	799	691	286	53.0	57.0	41.1	51.0	31.8	45.2	102
MB12NS200E	1036528	808	700	318	53.0	57.0	41.1	51.0	31.8	45.2	102
MB12NS285E	1036537	832	724	353	53.0	57.0	41.1	51.0	31.8	45.2	102
MB12NS350E	1036546	846	738	381	53.0	57.0	41.1	51.0	31.8	45.2	102
MB12NS650E	1036555	909	776	456	53.0	57.0	41.1	51.0	31.8	45.2	102
MB15NS200E	1036564	955	828	318	76.5	76.0	60.5	51.0	31.8	45.2	127
MB15NS350E	1036573	986	859	381	76.5	76.0	60.5	51.0	31.8	45.2	127
MB15NS650E	1036582	1022	895	456	76.5	76.0	60.5	51.0	31.8	45.2	127
MB15NS1150E	1036591	1072	945	549	76.5	76.0	60.5	51.0	31.8	45.2	127

4:1 Design Factor. *Utilizes Crosby "N" style hooks with integrated latch.
Replacement latch kit is S-4320. PL latch and S-4055 latch will not fit.

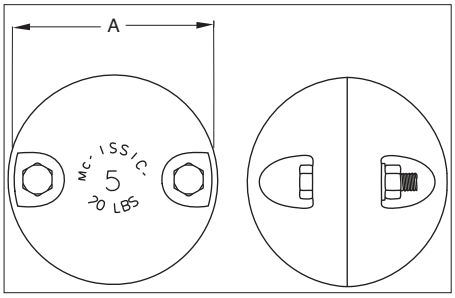


UB-500NS Non Swivel Overhaul Balls with SHUR-LOC® Hooks

Model No.	UB-500NS "S" Stock No.	Dimensions (mm)								
		A	B	C	D	E	F	H	I	J
MB4NS35S	1036407	525	462	191	46.5	29.2	23.9	35.1	19.1	33.3
MB4NS85S	1036416	547	484	235	46.5	29.2	23.9	35.1	19.1	33.3
MB4NS150S	1036425	573	509	286	46.5	29.2	23.9	35.1	19.1	33.3
MB4NS200S	1036434	582	519	318	46.5	29.2	23.9	35.1	19.1	33.3
MB7NS85S	1036443	607	541	235	53.5	42.2	29.5	35.1	19.1	33.3
MB7NS150S	1036452	642	566	286	53.5	42.2	29.5	35.1	19.1	33.3
MB7NS200S	1036461	650	575	318	53.5	42.2	29.5	35.1	19.1	33.3
MB7NS285S	1036470	675	600	353	53.5	42.2	29.5	35.1	19.1	33.3
MB10NS150S	1036479	793	691	286	63.0	52.0	38.1	51.0	31.8	45.2
MB10NS200S	1036488	803	700	318	63.0	52.0	38.1	51.0	31.8	45.2
MB10NS285S	1036497	827	724	353	63.0	52.0	38.1	51.0	31.8	45.2
MB10NS350S	1036506	841	738	381	63.0	52.0	38.1	51.0	31.8	45.2
MB10NS650S	1036511	879	776	456	63.0	52.0	38.1	51.0	31.8	45.2

Split
Overhaul
Ball

- Attaches easily to Wireline.

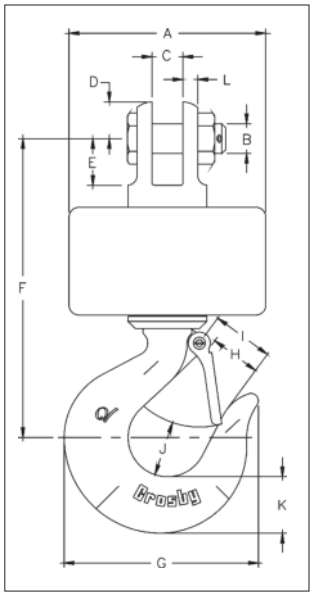


Split Overhaul Ball

Catalog No.	Stock No.	Wire Rope Diameter (mm)	Weight Each (kg)	Ball Diameter A (mm)
SHB - 15	2003822	6-8	6.80	129
SHB - 20	2003830	10	9.07	137
SHB - 50	2003831	13 - 16	22.7	181
SHB - 100	2003832	16 - 19 - 22	45.4	233

AS-15

- Utilizes genuine Crosby hooks which are forged alloy steel, Quenched & Tempered, and contain the patented QUIC-CHECK® marking.
- Entire overhaul ball is zinc plated to resist corrosion.
- Designed with angular contact bearings which maximizes efficiency, reliability, and service life of swivel and extend the life of the wireline.
- Available with wide jaw opening that utilizes nylon spools and shields.
- Designed for applications where headroom is critical.
- Other upper fittings available upon request.



Angular Contact Bearing Swivel Overhaul Balls

Stock No.	Working Load Limit (t)	Wire Rope Diameter (mm)	Dimensions (mm)												Weight Each (kg)
			A	B	C	D	E	F	G	H	I	J	K	L	
2009806	1.36	10	102	12.7	12.7	17.5	19.8	160	104	28.4	31.0	30.2	28.4	7.85	4.08
2009807	2.72	13	127	19.1	19.1	23.9	30.2	217	126	34.0	38.1	35.1	36.6	9.65	8.62
2003969	4.54	16	175	22.4	26.9	28.4	39.6	275	165	42.9	47.8	44.5	46.0	14.2	19.5
2009808	7.71	19	178	30.2	39.6	34.0	53.0	349	221	57.0	63.5	65.0	66.0	13.5	27.2

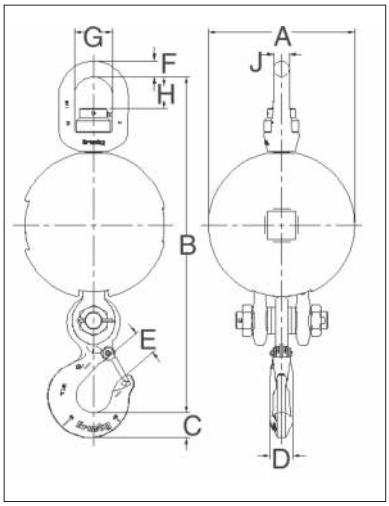
5:1 Design Factor.

UB-550E

UB-550 Top Swivel Overhaul Balls

- Top swivel design assures that the ball remains stationary if the wireline spins.
- Utilizes genuine forged Crosby hooks, bail and connector.
- Quenched and Tempered.
- Both styles of hooks incorporate QUIC-CHECK® Deformation and Angle Indicators.
- Easy disassembly for periodic inspection and maintenance.
- Design factor of 4:1.

UB-550S



UB-550E Top Swivel Overhaul Balls with Crosby Eye Hook

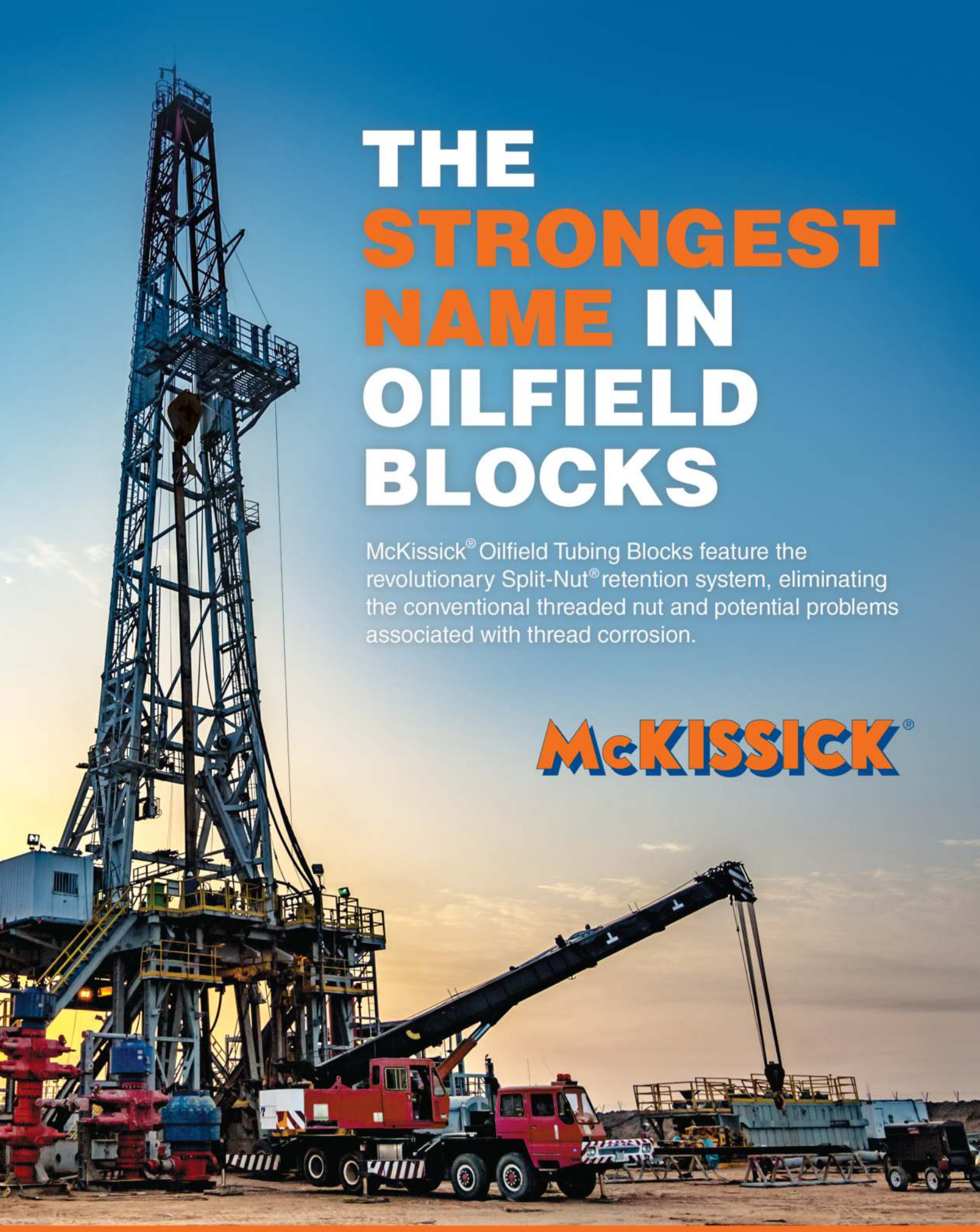
Stock No.	Model No.	Working Load Limit (t)	Weight Each (kg)	Dimensions (mm)								
				A	B	C	D	E	F	G	H	J
1036621	MB04BT085E	3.6	51.3	226	533	36.6	33.3	34.5	28.4	69.9	57.9	28.4
1036649	MB04BT150E	3.6	80.7	268	577	36.6	33.3	34.5	28.4	69.9	57.9	28.4
1036667	MB04BT200E	3.6	105	295	602	36.6	33.3	34.5	28.4	69.9	57.9	28.4
1036685	MB07BT085E	6.3	51.3	226	571	46.0	42.2	40.9	28.4	69.9	57.9	28.4
1036705	MB07BT150E	6.3	80.7	268	615	46.0	42.2	40.9	28.4	69.9	57.9	28.4
1036723	MB07BT200E	6.3	105	295	640	46.0	42.2	40.9	28.4	69.9	57.9	28.4

4:1 Design Factor.

UB-550S Top Swivel Overhaul Balls with SHUR-LOC® Eye Hook

Stock No.	Model No.	Working Load Limit (t)	Weight Each (kg)	Dimensions (mm)								
				A	B	C	D	E	F	G	H	J
1036630	MB04BT085S	3.6	51.3	226	592	42.4	29.5	53.6	28.4	69.9	57.9	28.4
1036658	MB04BT150S	3.6	80.7	268	636	42.4	29.5	53.6	28.4	69.9	57.9	28.4
1036676	MB04BT200S	3.6	105	295	661	42.4	29.5	53.6	28.4	69.9	57.9	28.4
1036694	MB07BT085S	6.3	51.3	226	592	42.4	29.5	53.6	28.4	69.9	57.9	28.4
1036714	MB07BT150S	6.3	80.7	268	636	42.4	29.5	53.6	28.4	69.9	57.9	28.4
1036732	MB07BT200S	6.3	105	295	661	42.4	29.5	53.6	28.4	69.9	57.9	28.4

4:1 Design Factor.


THE
STRONGEST
NAME IN
OILFIELD
BLOCKS
McKissick® Oilfield Tubing Blocks feature the revolutionary Split-Nut® retention system, eliminating the conventional threaded nut and potential problems associated with thread corrosion.
McKISSICK®

VALUE ADDED

- **Dual Rated:** To meet the requirements of both short tons and metric tons.
- **Metric Rating:** McKissick® snatch blocks are metric rated to a design factor of 4:1. Because they are metric rated with a world-class design, they are applicable to global use without conversion.
- **US Rating:** When compared to other blocks that are rated in short tons, the design factor of McKissick snatch blocks is 4.5 to 1.
- **Fatigue Properties:** McKissick snatch blocks are fatigue rated. The blocks are designed to meet specific fatigue performance levels and the requirements for the new Euronorm Standards: 20,000 cycles at 1-1/2 times the Working Load Limit.
- **Latch Kits:** McKissick snatch blocks that utilize a hook as an end fitting connection are equipped with latches.
- **Application Information:** Application and warning information for tackle block systems is attached directly to each block. In addition, each block has a product warning sticker attached directly to it for the purpose of giving specific warning instructions about the block.
- **Lock Nut:** McKissick snatch blocks have a special high-performance lock nut on the non-moveable side plate for securing the sheave pin.
- **Sheave & Wireline:** Sheaves for McKissick snatch blocks have a machine-formed groove.
- **Secondary Securement Systems:** McKissick snatch blocks are designed to incorporate a secondary securement system that retains the end fitting connection bolt when the block is in the closed position. In addition, a patented system retains the end fitting connection bolt when the block is in the open position, thus eliminating the loss of block parts.

404
TAIL BOARD

418
WITH HOOK

419
WITH SHACKLE

SNATCH BLOCK DEMONSTRATION

- How to determine snatch block capacity
- How to use a snatch block to gain a mechanical advantage
- Importance of using a load cell in conjunction with a snatch block on a lift

WATCH VIDEO

15

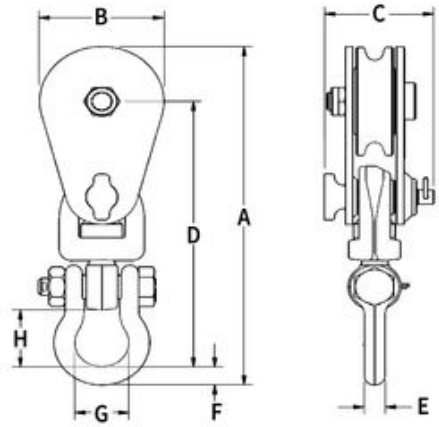
SNATCH BLOCK WITH SHACKLE FITTING, SINGLE SHEAVE, 2-12t

Fatigue Rated® CE

L-170

L-160

417



- Opening feature permits easy insertion of rope without reeving, or while the block is suspended.
- Bolt for opening feature is retained, to ensure no lost bolts.
- Forged steel swivel tees, yokes and shackles.
- Can be furnished with bronze bushings or roller bearings.
- Center pin equipped with pressure lube fitting.
- All sizes feature sheave grooves suited for a range of wireline diameters.
- Meets or exceeds all requirements of ASME B30.26. Importantly, these blocks meet other critical performance requirements including fatigue life and material traceability, not addressed by ASME B30.26.
- 417 alloy snatch blocks feature a significant reduction in weight compared to snatch blocks made of non-alloy materials.
- L-170 snatch blocks (with shackle or hook) feature an easy-to-open bolt design. The retaining bolt is released by rotating the fitting assembly, no tools required.
- Crosby's Engineered Solutions Group is ready to discuss your requirements and help select or develop the ideal block for your application.
- Visit thecrosbygroup.com/engineeredsolutions for more information.

APPLICATION AND WARNING INFORMATION SECTION 17

Working Load Limit (t)	Wire Rope Diameter (mm)	Sheave Diameter (mm)	Bearing Code	Weight Each (kg)	Catalog No.	Stock No.	Dimensions (mm)							
							A	B	C	D	E	F	G	H
2 metric tons														
2	8 - 10	76	BB	1.8	419 w/Eye	109037†	220	76	67	168	14	14	35	35
2	8 - 10	76	BB	2.3	419	109091	235	76	67	185	13	13	34	40
4 metric tons														
4	10 - 13	114	BB	5.4	419	109064	340	108	79	268	16	18	43	51
5 metric tons														
5	10 - 13 ‡	102	BB	5.0	L-170	599828	353	114	75	278	16	18	43	51
5	10 - 13 ‡	102	RB	5.0	L-170	599837	353	114	75	278	16	18	43	51
6 metric tons														
6*	10 - 13	127	BB	5.9	L-160	599524	351	130	94	268	16	18	43	51
6*	10 - 13	127	RB	5.9	L-160	599533	351	130	94	268	16	18	43	51
8 metric tons														
8	16 - 19	152	BB	12.7	419	109126	481	152	106	373	32	32	76	88
8	16 - 19	152	RB	12.7	419	109153	481	152	106	373	32	32	76	88
8	16 - 19	203	BB	15.0	419	109224	533	206	106	398	32	32	76	88
8	16 - 19	203	RB	15.0	419	109251	533	206	106	398	32	32	76	88
8	16 - 19	254	BB	19.5	419	109322	586	257	106	425	32	32	76	88
8	16 - 19	254	RB	19.5	419	109359	586	257	106	425	32	32	76	88
8	16 - 19	305	BB	24.9	419	109420	657	308	106	471	32	32	76	88
8	16 - 19	305	RB	24.9	419	109457	657	308	106	471	32	32	76	88
8	16 - 19	356	BB	30.4	419	109527	695	359	106	484	32	32	76	88
8	16 - 19	356	RB	30.4	419	109545	695	359	106	484	32	32	76	88
12 metric tons														
12*	16 - 19	146	BB	13.2	L-160	599588	483	152	106	375	32	32	76	88
12*	16 - 19	146	RB	13.2	L-160	599597	483	152	106	375	32	32	76	88
12	19 - 22	152	BB	12.7	417	168972	481	152	106	373	32	32	76	88
12	19 - 22	152	RB	12.7	417	193757	481	152	106	373	32	32	76	88
12	19 - 22	203	BB	15.4	417	168990	533	206	106	398	32	32	76	88
12	19 - 22	203	RB	15.4	417	193819	533	206	106	398	32	32	76	88
12	19 - 22	254	BB	19.1	417	193882	586	257	106	425	32	32	76	88
12	19 - 22	254	RB	19.1	417	193935	586	257	106	425	32	32	76	88

4:1 Design Factor. *3.5:1 Design Factor. † Fitted with 32mm ID Swivel Eye ‡ Special Dual Groove Sheave also accepts 32mm Manilla Rope.

SNATCH BLOCK WITH SHACKLE FITTING, SINGLE SHEAVE, 15-60t

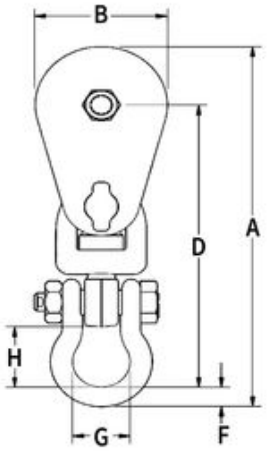
Fatigue Rated® CE

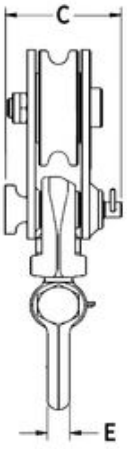
421

419

431

435





- Opening feature permits easy insertion of rope without reeving, or while the block is suspended.
- Can be furnished with bronze bushings or roller bearings.
- Center pin equipped with pressure lube fitting.
- All sizes feature sheave grooves suited for a range of wireline diameters.
- Meets or exceeds all requirements of ASME B30.26. Importantly, these blocks meet other critical performance requirements including fatigue life and material traceability, not addressed by ASME B30.26.
- 435 alloy snatch blocks feature a significant reduction in weight compared to snatch blocks made of non-alloy materials.
- Crosby's Engineered Solutions Group is ready to discuss your requirements and help select or develop the ideal block for your application. Visit thecrosbygroup.com/engineeredsolutions for more information.

APPLICATION AND WARNING INFORMATION SECTION 17

Working Load Limit (t)	Wire Rope Diameter (mm)	Sheave Diameter (mm)	Bearing Code	Weight Each (kg)	Catalog No.	Stock No.	Dimensions (mm)							
							A	B	C	D	E	F	G	H
15 metric tons														
15	19 - 22	203	BB	26.8	421	108308	584	206	129	437	38	44	79	79
15	19 - 22	203	RB	26.8	421	108309	584	206	129	437	38	44	79	79
15	19 - 22	254	BB	30.8	421	108390	629	257	129	456	38	44	79	79
15	19 - 22	254	RB	30.8	421	108391	629	257	129	456	38	44	79	79
15	19 - 22	406	BB	59.0	419	109607	806	409	129	559	38	44	79	79
15	19 - 22	406	RB	59.0	419	109625	806	409	129	559	38	44	79	79
15	22 - 26	457	BB	72.1	419	109643	841	460	129	565	38	44	79	79
15	22 - 26	457	RB	72.1	419	109661	841	460	129	565	38	44	79	79
20 metric tons														
20	26 - 29	203	BB	41.7	431	121022	675	206	152	502	51	70	94	101
20	26 - 29	203	RB	41.7	431	121040	675	206	152	502	51	70	94	101
20	26 - 29	254	BB	50.8	431	121095	727	257	152	526	51	70	94	102
20	26 - 29	254	RB	50.8	431	121111	727	257	152	526	51	70	94	102
20	26 - 29	305	BB	59.0	431	121175	779	311	152	553	51	70	94	102
20	26 - 29	305	RB	59.0	431	121193	779	311	152	553	51	70	94	102
20	26 - 29	356	BB	72.6	431	121255	838	356	152	591	51	70	94	102
20	26 - 29	356	RB	72.6	431	121273	838	356	152	591	51	70	94	102
25 metric tons														
25	26 - 32	203	BB	46.7	435	208954	688	210	156	513	51	70	94	102
25	26 - 32	254	BB	53.1	435	208965	745	260	156	545	51	70	94	102
25	26 - 32	457	BB	122.5	431	119495	1051	464	181	740	51	79	89	122
25	26 - 32	457	RB	127.0	431	119496	1051	464	181	740	51	79	89	122
30 metric tons														
30	26 - 32	305	BB	94.3	435	208976	930	311	178	695	51	79	89	122
30	26 - 32	356	BB	104.3	435	208977	987	362	178	727	51	79	89	122
30	26 - 32	508	BB	228.2	431	119589	1331	514	211	974	64	100	143	179
30	26 - 32	508	RB	220.0	431	119598	1331	514	211	974	64	100	143	179
30	26 - 32	610	BB	263.5	431	119605	1422	616	211	1016	64	100	143	179
30	26 - 32	610	RB	260.8	431	119614	1422	616	211	1016	64	100	143	179
60 metric tons														
60	26 - 32	305	BB	142.9	435	8027291	1058	308	220	843	52	61	146	155

4:1 Design Factor.

McKISSICK

SNATCH BLOCK WITH HOOK FITTING, SINGLE SHEAVE, 2-12t

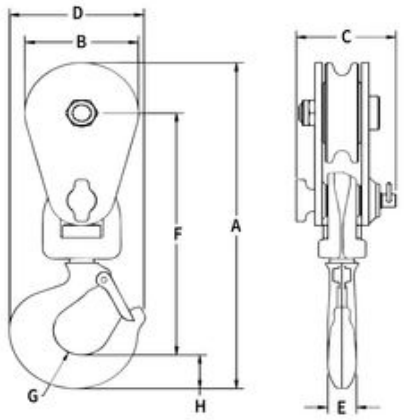
Fatigue Rated CE

416

L-170

L-160

C-720



- Opening feature permits easy insertion of rope without reeving, or while the block is suspended.
- Bolt for opening feature is retained, to ensure no lost bolts.
- Forged steel swivel tees, yokes and hooks.
- Furnished with a latch installed.
- Can be furnished with bronze bushings or roller bearings.
- Center pin equipped with pressure lube fitting.
- All sizes feature sheave grooves suited for a range of wireline diameters.
- Meets or exceeds all requirements of ASME B30.26. Importantly, these blocks meet other critical performance requirements including fatigue life and material traceability, not addressed by ASME B30.26.
- 416 alloy snatch blocks feature a significant reduction in weight compared to snatch blocks made of non-alloy materials.
- L-170 snatch blocks (with shackle or hook) feature an easy-to-open bolt design. The retaining bolt is released by rotating the fitting assembly, no tools required.
- Crosby's Engineered Solutions Group is ready to discuss your requirements and help select or develop the ideal block for your application.
- Visit thecrosbygroup.com/engineeredsolutions for more information.

APPLICATION AND WARNING INFORMATION
SECTION 17

Working Load Limit (t)	Wire Rope Diameter (mm)	Sheave Diameter (mm)	Bearing Code	Weight Each (kg)	Catalog No.	Stock No.	Dimensions (mm)							
							A	B	C	D	E	F	G	H
2 metric tons														
2	8 - 10	76	BB	2.3	418	108038	247	76	67	91	19	184	19	25
4 metric tons														
4	10 - 13	114	BB	5.4	418	108065	359	108	79	133	25	257	24	47
5 metric tons														
5	10 - 13 ‡	102	BB	5.0	L-170	599800	371	116	75	133	25	267	24	47
5	10 - 13 ‡	102	RB	5.0	L-170	599819	371	116	75	133	25	267	24	47
6 metric tons														
6*	10 - 13	127	BB	5.9	L-160	599506	370	130	94	133	25	257	24	47
6*	10 - 13	127	RB	5.9	L-160	599515	370	130	94	133	25	257	24	47
7 short Tons														
7T*	19 - 22	6	BB	12.7	C-720	280010	410	152	97	159	37	288	32	41
8 metric tons														
8	16 - 19	152	BB	12.2	418	108127	481	152	106	173	40	344	33	61
8	16 - 19	152	RB	12.2	418	108154	481	152	106	173	40	344	33	61
8	16 - 19	203	BB	15.0	418	108225	534	206	106	173	40	369	33	61
8	16 - 19	203	RB	15.0	418	108252	534	206	106	173	40	369	33	61
8	16 - 19	254	BB	18.6	418	108323	586	257	106	173	40	396	33	61
8	16 - 19	254	RB	18.6	418	108350	586	257	106	173	40	396	33	61
8	16 - 19	305	BB	21.8	418	108421	658	308	106	173	40	442	33	61
8	16 - 19	305	RB	21.8	418	108458	658	308	106	173	40	442	33	61
8	16 - 19	356	BB	24.9	418	108528	696	359	106	173	40	455	33	61
8	16 - 19	356	RB	24.9	418	108546	696	359	106	173	40	455	33	61
12 metric tons														
12*	16 - 19	146	BB	13.2	L-160	599560	508	152	106	200	40	365	37	67
12*	16 - 19	146	RB	13.2	L-160	599579	508	152	106	200	40	365	37	67
12	19 - 22	152	BB	11.8	416	193427	505	152	106	200	40	362	37	67
12	19 - 22	152	RB	11.8	416	193472	505	152	106	200	40	362	37	67
12	19 - 22	203	BB	15.0	416	193490	558	206	106	200	40	388	37	67
12	19 - 22	203	RB	15.0	416	193542	558	206	106	200	40	388	37	67
12	19 - 22	254	BB	18.6	416	193613	610	257	106	200	40	415	37	67
12	19 - 22	254	RB	18.6	416	193677	610	257	106	200	40	415	37	67

4:1 Design Factor. *3.5:1 Design Factor.. ‡ Special Dual Groove Sheave also accepts 32mm Manilla Rope

SNATCH BLOCK WITH HOOK FITTING, SINGLE SHEAVE, 15-30t

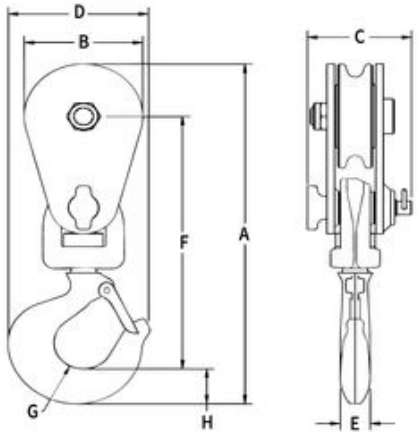
Fatigue Rated® CE

420

418

430

434



- Opening feature permits easy insertion of rope without reeving, or while the block is suspended.
- Furnished with a latch installed.
- Can be furnished with bronze bushings or roller bearings.
- Center pin equipped with pressure lube fitting.
- All sizes feature sheave grooves suited for a range of wireline diameters.
- Meets or exceeds all requirements of ASME B30.26. Importantly, these blocks meet other critical performance requirements including fatigue life and material traceability, not addressed by ASME B30.26.
- 434 snatch blocks feature a significant reduction in weight compared to snatch blocks made of non-alloy materials.
- Crosby's Engineered Solutions Group is ready to discuss your requirements and help select or develop the ideal block for your application.
- Visit thecrosbygroup.com/engineeredsolutions for more information.

APPLICATION AND WARNING INFORMATION SECTION 17

Working Load Limit (t)	Wire Rope Diameter (mm)	Sheave Diameter (mm)	Bearing Code	Weight Each (kg)	Catalog No.	Stock No.	Dimensions (mm)							
							A	B	C	D	E	F	G	H
15 metric tons														
15	19 - 22	203	BB	23.1	420	108275	597	206	129	212	45	419	38	74
15	19 - 22	203	RB	23.1	420	108276	597	206	129	212	45	419	38	74
15	19 - 22	254	BB	28.6	420	108371	641	257	129	212	45	438	38	74
15	19 - 22	254	RB	28.6	420	108372	641	257	129	212	45	438	38	74
15	19 - 22	406	BB	59.0	418	108608	819	409	129	212	45	540	38	74
15	19 - 22	406	RB	59.0	418	108626	819	409	129	212	45	540	38	74
15	22 - 26	457	BB	68.0	418	108644	851	460	129	212	45	546	38	74
15	22 - 26	457	RB	68.0	418	108662	851	460	129	212	45	546	38	74
20 metric tons														
20	26 - 29	203	BB	34.0	430	120023	657	206	152	239	51	468	38	86
20	26 - 29	203	RB	34.0	430	120041	657	206	152	239	51	468	38	86
20	26 - 29	254	BB	40.4	430	120096	710	257	152	239	51	495	38	86
20	26 - 29	254	RB	40.4	430	120112	710	257	152	239	51	495	38	86
20	26 - 29	305	BB	46.7	430	120176	762	311	152	239	51	521	38	86
20	26 - 29	305	RB	46.7	430	120194	762	311	152	239	51	521	38	86
20	26 - 29	356	BB	55.8	430	120256	821	356	152	239	51	558	38	86
20	26 - 29	356	RB	55.8	430	120274	821	356	152	239	51	558	38	86
25 metric tons														
25	26 - 32	203	BB	40.8	434	208896	675	210	156	238	51	484	38	86
25	26 - 32	254	BB	48.5	434	208910	727	260	156	238	51	511	38	86
25	26 - 32	457	BB	108.9	430	119486	1052	464	181	299	64	710	49	110
25	26 - 32	457	RB	108.9	430	119487	1052	464	181	299	64	710	49	110
30 metric tons														
30	26 - 32	305	BB	74.8	434	208931	923	311	178	299	64	657	49	110
30	26 - 32	356	BB	81.6	434	208932	980	362	178	299	64	689	49	110
30	26 - 32	508	BB	170.1	430	119507	1325	514	211	387	76	917	57	150
30	26 - 32	508	RB	170.1	430	119516	1325	514	211	387	76	917	57	150
30	26 - 32	610	BB	204.1	430	119525	1416	616	211	387	76	959	57	150
30	26 - 32	610	RB	204.1	430	119534	1416	616	211	387	76	959	57	150

4:1 Design Factor.

McKISSICK

SNATCH BLOCK, TAIL BOARD, SINGLE SHEAVE, 2-12t

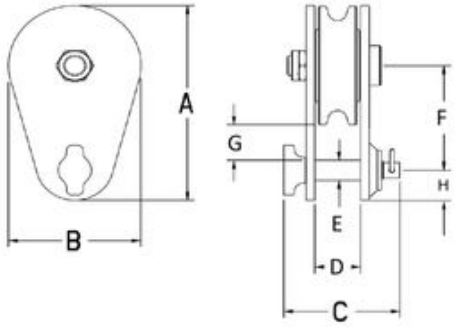
Fatigue Rated® CE

404

L-170

L-160

402



- Opening feature permits easy insertion of rope without reeving. Bolt for opening feature is retained, to ensure no lost bolts.
- All sizes feature sheave grooves suited for a range of wireline diameters.
- Meets or exceeds all requirements of ASME B30.26. Importantly, these blocks meet other critical performance requirements including fatigue life and material traceability, not addressed by ASME B30.26.
- 402 snatch blocks feature a significant reduction in weight compared to snatch blocks made of non-alloy materials.
- Crosby's Engineered Solutions Group is ready to discuss your requirements and help select or develop the ideal block for your application.
- Visit thecrosbygroup.com/engineeredsolutions for more information.

APPLICATION AND WARNING INFORMATION SECTION 17

Working Load Limit (t)	Wire Rope Diameter (mm)	Sheave Diameter (mm)	Bearing Code	Weight Each (kg)	Model No.	Stock No.	Dimensions (mm)							
							A	B	C	D	E	F	G	H
2 metric tons														
2	8 - 10	76	BB	1.4	404	102016	124	76	67	26	13	67	22	19.1
4 metric tons														
4	10 - 13	114	BB	3.2	404	102025	197	108	79	40	19	108	41	35.1
5 metric tons														
5	10 - 13 ‡	102	BB	3.2	L-170	599846	213	114	75	40	22	119	57	36.6
5	10 - 13 ‡	102	RB	5.0	L-170	599855	213	114	75	40	22	119	57	36.6
6 metric tons														
6*	10 - 13	127	BB	5.9	L-160	599542	210	130	94	39	19	108	35	36.6
6*	10 - 13	127	RB	5.9	L-160	599551	210	130	94	39	19	108	35	36.6
8 metric tons														
8	16 - 19	152	BB	6.8	404	102098	251	152	106	46	25	130	41	44.5
8	16 - 19	152	RB	6.8	404	102114	251	152	106	46	25	130	41	44.5
8	16 - 19	203	BB	9.5	404	102169	303	206	106	46	25	155	41	44.5
8	16 - 19	203	RB	9.5	404	102187	303	206	106	46	25	155	41	44.5
8	16 - 19	254	BB	13.2	404	102230	356	257	106	46	25	183	43	44.5
8	16 - 19	254	RB	13.2	404	102258	356	257	106	46	25	183	43	44.5
8	16 - 19	305	BB	16.3	404	102301	427	308	106	46	25	229	64	44.5
8	16 - 19	305	RB	16.3	404	102329	427	308	106	46	25	229	64	44.5
12 metric tons														
12*	16 - 19	146	BB	13.2	L-160	599604	253	152	106	44	25	133	47	44.5
12*	16 - 19	146	RB	13.2	L-160	599613	253	152	106	44	25	133	47	44.5
12	19 - 22	152	BB	6.8	402	179238	251	152	106	46	25	130	41	44.5
12	19 - 22	152	RB	6.8	402	179283	251	152	106	46	25	130	41	44.5
12	19 - 22	203	BB	9.5	402	179318	303	206	106	46	25	155	41	44.5
12	19 - 22	203	RB	9.5	402	179363	303	206	106	46	25	155	41	44.5
12	19 - 22	254	BB	13.2	402	179434	356	257	106	46	25	183	43	44.5
12	19 - 22	254	RB	13.2	402	179498	356	257	106	46	25	183	43	44.5

4:1 Design Factor. *3.5:1 Design Factor. ‡ Special Dual Groove Sheave also accepts 32mm Manilla Rope.

SNATCH BLOCK, TAIL BOARD, SINGLE SHEAVE, 15-60t

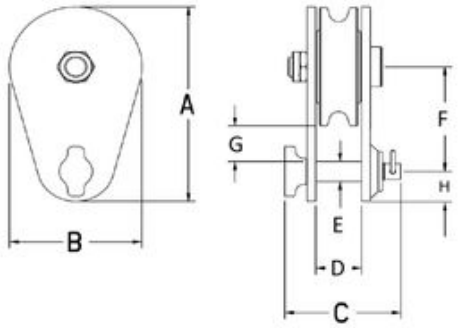
Fatigue Rated

CE

406

407

401



- Opening feature permits easy insertion of rope without reeving. Bolt for opening feature is retained, to ensure no lost bolts.
- Can be furnished with bronze bushings or roller bearings.
- Center pin equipped with pressure lube fitting.
- All sizes feature sheave grooves suited for a range of wireline diameters.
- Meets or exceeds all requirements of ASME B30.26. Importantly, these blocks meet other critical performance requirements including fatigue life and material traceability, not addressed by ASME B30.26.

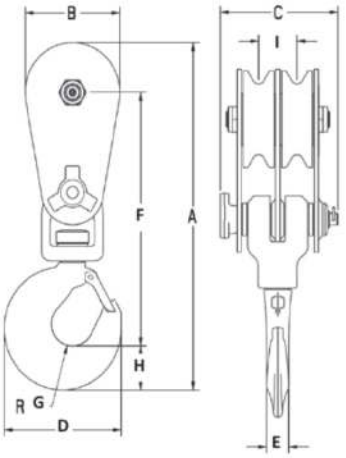
APPLICATION AND WARNING INFORMATION
SECTION 17

Working Load Limit (t)	Wire Rope Diameter (mm)	Sheave Diameter (mm)	Bearing Code	Weight Each (kg)	Model No.	Stock No.	Dimensions (mm)							
							A	B	C	D	E	F	G	H
15 metric tons														
15	19 - 22	203	BB	13.6	406	108311	335	206	130	60	32	171	54	60.5
15	19 - 22	203	RB	13.6	406	108312	335	206	130	60	32	171	54	60.5
15	19 - 22	254	BB	19.1	406	108406	379	257	130	60	32	191	49	60.5
15	19 - 22	254	RB	19.1	406	108407	379	257	130	60	32	191	49	60.5
20 metric tons														
20	26 - 29	203	BB	19.1	407	103523	344	206	152	65	38	181	60	60.5
20	26 - 29	203	RB	19.1	407	103541	344	206	152	65	38	181	60	60.5
20	26 - 29	254	BB	24.9	407	103603	397	257	152	65	38	208	62	60.5
20	26 - 29	254	RB	24.9	407	103621	397	257	152	65	38	208	62	60.5
20	26 - 29	305	BB	31.8	407	103685	451	311	152	65	38	235	65	60.5
20	26 - 29	305	RB	31.8	407	103701	451	311	152	65	38	235	65	60.5
20	26 - 29	356	BB	40.8	407	103765	511	356	152	65	38	272	75	60.5
20	26 - 29	356	RB	40.8	407	103783	511	356	152	65	38	272	75	60.5
25 metric tons														
25	26 - 32	203	BB	22.7	401	178151	343	210	156	65	38	181	60	57.2
25	26 - 32	254	BB	29.5	401	179167	392	260	156	65	38	208	62	53.8
25	26 - 32	457	BB	74.8	407	119652	625	464	181	77	44	330	79	63.5
25	26 - 32	457	RB	74.8	407	119653	625	464	181	77	44	330	79	63.5
30 metric tons														
30	26 - 32	305	BB	43.1	401	179178	473	311	178	77	44	254	79	63.5
30	26 - 32	356	BB	49.9	401	179187	530	362	178	77	44	286	86	63.5
30	26 - 32	508	BB	97.5	407	119669	734	514	211	90	57	387	105	88.9
30	26 - 32	508	RB	97.5	407	119678	734	514	211	90	57	387	105	88.9
30	26 - 32	610	BB	131.5	407	119687	826	616	211	90	57	429	95	88.9
30	26 - 32	610	RB	131.5	407	119696	826	616	211	90	57	429	95	88.9
60 metric tons														
60	26 - 32	305	BB	43.1	401	8027292	516	308	220	71	64	273	89	88.9

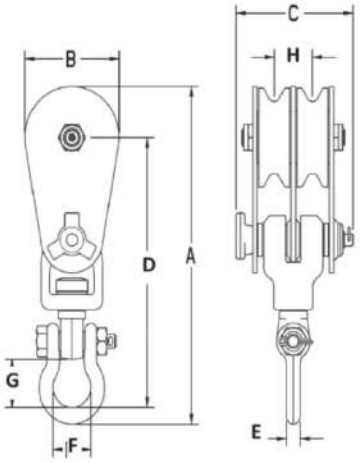
4:1 Design Factor.

McKISSICK

SNATCH BLOCK WITH HOOK OR SHACKLE FITTING DOUBLE SHEAVE, 4-12t



408
With Hook



409
With Shackle

- Two sheave snatch block to allow for additional mechanical advantage, must be reeved with four parts of line.
- Opening feature permits easy insertion of wireline in both sheaves with removal of one bolt.
- 408 is furnished with S-4320 hook latch.
- Center Pin equipped with pressure lube fittings.
- All sizes feature sheave grooves suited for a range of wireline diameters.
- Meets or exceeds all requirements of ASME B30.26. Importantly, these blocks meet other critical performance requirements including fatigue life and material traceability, not addressed by ASME B30.26.
- Crosby's Engineered Solutions Group is ready to discuss your requirements and help select or develop the ideal block for your application. Visit engineeredsolutions for more information.

408 Double Sheave Snatch Block with Hook

Working Load Limit (t)	Wire Rope Diameter (mm)	Sheave Diameter (mm)	Bearing Code	Weight Each (kg)	Stock No.	Dimensions (mm)								
						A	B	C	D	E	F	G	H	I
4 metric tons														
4	10 - 13	114	BB	8.2	104023	375	108	133	133	25	274	24	47	44
12 metric tons														
12	16 - 19	152	BB	20.4	104103	536	152	156	200	40	394	37	67	52
12	16 - 19	152	RB	20.4	104121	536	152	156	200	40	394	37	67	52
12	16 - 19	203	BB	24	104185	589	206	156	200	40	419	37	67	52
12	16 - 19	203	RB	24	104201	589	206	156	200	40	419	37	67	52

4:1 Design Factor.

409 Double Sheave Snatch Block with Shackle

Working Load Limit (t)	Wire Rope Diameter (mm)	Sheave Diameter (mm)	Bearing Code	Weight Each (kg)	Stock No.	Dimensions (mm)							
						A	B	C	D	E	F	G	H
4 metric tons													
4	10 - 13	114	BB	8.2	105022	356	108	133	285	16	43	51	44
12 metric tons													
12	16 - 19	152	BB	22.7	105102	536	152	156	416	38	79	79	52
12	16 - 19	152	RB	22.7	105120	536	152	156	416	38	79	79	52
12	16 - 19	203	BB	26.3	105184	589	206	156	441	38	79	79	52
12	16 - 19	203	RB	26.3	105200	589	206	156	441	38	79	79	52

4:1 Design Factor.

Fatigue Rated

APPLICATION AND WARNING INFORMATION
SECTION 17

HF-1

- Hay Fork Pulleys with Swivel Hook or Swivel Eye
- Forged steel eyes and hooks.
- Available painted or zinc plated.
- One piece pressed steel shells.
- Edges well rounded to prevent chaffing of rope.
- Can be equipped with hook latch.
- Furnished with roller bearings.
- Pressure lube fittings.
- Natural Rope: Rope constructed of natural or plant based fibers, including manila, hemp, linen, cotton, coir, jute, and sisal.

HF-2

HF-1 / HF-2 Hay Fork Pulleys with Swivel Hook or Swivel Eye

Sheave Diameter (mm)	Model No.	Hay Fork Pulleys Stock No.		Working Load Limit (t)	Wire Rope Diameter (mm)	Rope Type	End Fitting	Weight Each (kg)
		Painted	Zinc Plated					
114	HF-1	170022	170594	.91	32 MR	Natural Rope	Swivel Hook	2.72
114	HF-2	170086	170629	.91	32 MR	Natural Rope	Swivel Eye	2.72
114	HF-3	170148	170656	.91	13 WR	Wire Rope	Swivel Hook	2.72
114	HF-4	170200	170683	.91	13 WR	Wire Rope	Swivel Eye	2.72
203	HF-5	170264	-	1.81	13 WR	Wire Rope	Swivel Eye	4.99
152	HF-11	170380	-	1.81	38 MR	Natural Rope	Swivel Hook	4.99
152	HF-12	170442	-	1.81	38 MR	Natural Rope	Swivel Eye	4.99
152	HF-13	170503	-	1.81	16 WR	Wire Rope	Swivel Hook	4.99
152	HF-14	170567	-	1.81	16 WR	Wire Rope	Swivel Eye	4.99

4:1 Design Factor.

171

- Steel sheaves with roller bearings and pressure lubrication.
- Forged steel swivel eyes.
- Easy opening feature shown available in 303mm size only.

APPLICATION AND WARNING INFORMATION
SECTION 17

171 Tong Block

Sheave Diameter (mm)	Stock No.	Working Load Limit (t)	Wire Rope Diameter (mm)	Weight Each (kg)
152	171012	.45	19	4.99
203	171058	.91	19	5.44
254	171101	2.27	19	13.6
305	171156	2.27	19	15.9

4:1 Design Factor.

443

- All steel construction, steel sheaves mounted on roller bearings, grooved for maximum of 3/4" wire rope diameter.
- May be used with three parts of line if utilizing dead end becket.

443 Lay Down Block

Sheave Diameter (mm)	Stock No.	Working Load Limit (t)	Wire Rope Diameter (mm)	Weight Each (kg)
114	171414	.23	13	5.44
152	171432	.45	19	7.71

4:1 Design Factor.

Tower/Derrick Hoist Blocks

M-491

G-491

- New design provides the dependability of standard McKissick® Snatch Blocks, along with features that make it perfect for the challenging needs of Tugger Hoist and Tower Erection applications.
- Fully recessed sideplate design eliminates gap between sheave rim and sideplate, providing failsafe capture of the sheave in the case of center pin overloading.
- Sealed tapered roller bearings extend the life of the center pin and bearings, and allows for faster line speeds than recommended with standard snatch blocks.
- Holes through side plates are available for secondary block securement device.
- Suitable for hoisting personnel, contingent upon all employees, including the winch operator, being trained to follow applicable Federal, local and industry standards.
  - Tugger/Derrick applications: API RP54
  - Tower applications: OSHA directive CPL 2-1.36
- Blocks furnished with dual rated wireline sheaves.
- Forged steel swivels, tees, yokes and shackles are Quenched & Tempered.
- Sheave lubrication through center pin for easy maintenance.
- All blocks 356mm and larger are furnished with McKissick® Roll Forged sheaves with flame hardened grooves.
- Shackle fitting swivels for easy positioning.
- Manufactured by an API Q1 Certified facility.
- ABS Type Approval and Certification under 2019 Guide for Certification of Lifting Appliances and 2019 Guide for Classification of Drilling Systems.

Q&T

TA TYPE APPROVED

APPLICATION AND WARNING INFORMATION
SECTION 17

M-491 / G-491 Tower/Derrick Hoist Blocks

Working Load Limit (t)	Sheave Diameter (mm)	Wire Rope Diameter (mm)	M-491 Stock No. Painted	G-491 Stock No. Galvanized	Weight Each (kg)
4	203	10 - 13	2020161	2020170	16
8	254	10 - 13	2020806	2020815	25
8	254	13 - 14	2020824	2020833	25
12	254	13 - 14	2021118	2021127	25
12	356	13 - 16	2021136	2021145	43
12	356	16 - 19	2021154	2021163	43
15	406	19 - 22	2021172	2021181	68
15	406	22 - 26	2021190	2021199	48
25	457	26 - 29	2032312	2032315	118
30	508	29 - 32	2032321	2032324	306

4:1 Design Factor.

70 Series
Blocks

McKissick® Oilfield Tubing Blocks

80 Series
Blocks

- Utilizes revolutionary new Split Nut Retention System that eliminates conventional threaded nut and potential problems associated with thread corrosion.
- The 70 Series has a spring-loaded hook that is better for heavy usage and larger depths. Tends to last longer since the shock loads are somewhat absorbed.
- The 80 Series has no spring loaded hook and is better for shallow depths and rework.
- Exclusive E-Z opening guards, no bolts to pull out and lose. Feature gives fastest possible exposure of sheave cluster for quick reeving.
- Extremely short overall length, extra weight, excellent balance for fast non-wobbling falls.
- Roller thrust bearing in hook.
- Duplex hook for easy elevator operation, locks in eight positions.
- Also available with rod hook clevis.
- Completely streamlined, no projections.
- McKissick® Roll-Forged, flame hardened sheaves, grooved to API profile for proper wire rope diameter.
- Separate lubrication channel to each sheave.
- Double row, pre-adjusted tapered bearings with seals.
- McKissick Split-Nut® hook parts precision machined and individually fitted for maximum performance.
- Manufactured to API-8C specifications.
- Lock arms with self retaining bolts.
- "A" configuration has rod hook clevis attachment as standard.
- "AN" configuration utilizes new 35 short Ton clevis.

Fatigue Rated

Licensed Under API Spec 8C-0021

APPLICATION AND WARNING INFORMATION
SECTION 17

70 Series Tubing Blocks

Stock No.	Block Config.	Working Load Limit (t)	Wire Rope Diameter (mm)	Number of Sheaves	Sheave Diameter (mm)	Rod Hook Clevis Working Load Limit (t)	Weight (kg)
112083	24" 73-A WT	90	26	3	610	18	1523
111922	24" 73-AN	113	26	3	610	31	1266
112084	24" 73-AN WT	113	26	3	610	31	1532
120609	30" 73-AN WT	136	26	3	762	31	2330
169057	30" 74-A	136	26	4	762	20	2178
125550	30" 74-A	136	28	4	762	20	2178
112552	30" 74-AN	158	28	4	762	31	2234
128821	30" 74-AN WT	158	28	4	762	31	2710

80 Series Tubing Blocks

Stock No.	Block Config.	Working Load Limit (t)	Wire Rope Diameter (mm)	Number of Sheaves	Sheave Diameter (mm)	Rod Hook Clevis Working Load Limit (t)	Weight (kg)
206310	24" 82	68	26	2	610	-	782
112279	24" 83-A	90	26	3	610	18	974
112476	24" 83-A WT	113	26	3	610	18	1254
121027	24" 83-AN WT	113	26	3	610	31	1250
117534	24" 84-AN WT	113	26	4	610	31	1611
205902	30" 83-A WT	136	26	3	762	20	2056
120827	30" 83-AN WT	136	26	3	762	31	2058
121009	30" 84-AN WT	136	26	4	762	31	2290
117514	30" 84-A	136	28	4	762	20	2279
120418	30" 84-AN	136	28	4	762	31	1889
3595907	30" 84 WT	136	28	4	762	-	2225
121018	30" 84-AN WT	136	28	4	762	31	2291
117552	30" 84-AN WT	158	28	4	762	31	2414

WELL LOGGER'S BLOCKS

475

477

476

- Alloy aluminum housing for maximum strength and minimum weight.
- Extra large double row, pre-adjusted sealed tapered bearing.
- Quick opening pin for fast string-up, light weight for easy handling.

Licensed Under API Spec 8C–0021

APPLICATION AND WARNING INFORMATION
SECTION 17

475 / 477 Floor Blocks

Sheave Diameter (mm)	Model No.	Floor Block Stock No.	Working Load Limit (t)	Conductor Cable Size (mm)	Weight Each (kg)	Connection
178	475	180020	1.35	5	4.5	Swivel Hanger
254	475	180253	2.25	8	9.5	Swivel Hanger
305	475	180440	2.25	8	10.8	Swivel Hanger
356	475	180618	2.25	8	19.5	Swivel Hanger
356	477	169784	5.4	6	26.3	Swivel Clevis
508	477	191072	5.4	6	31.8	Swivel Clevis
610	477	191107	9.0	8	58.9	Swivel Clevis

4:1 Design Factor.

476 Top Blocks

Sheave Diameter (mm)	Model No.	Top Block Stock No.	Working Load Limit (t)	Conductor Cable Size (mm)	Weight Each (kg)	Connection
178	476	180075	2.25	5	4.5	Stinger Pin
254	476	180333	3.6	8	9.5	Stinger Pin
305	476	180529	3.6	8	10.8	Stinger Pin
356	476	180707	3.6	8	19.5	Stinger Pin

4:1 Design Factor.

458

Guy Line Blocks

- Used on guy lines to gain mechanical advantage through rapid take-up, taking less pull to guy down.

459

APPLICATION AND WARNING INFORMATION
SECTION 17

Guy Line Blocks

Model No.	No. of Sheaves	Stock No.	Working Load Limit (t)	Sheave Diameter (mm)	Wire Rope Diameter (mm)	Weight Each (kg)
458	1	171619	4.5	152	13	9.5
458H	1	239067	7.2	152	14-16	11.3
459	2	171637	9	152	13	12.7
459H	2	239076	10.8	152	14-16	14.1

731

Crown Blocks

- McKissick® Roll-Forged sheaves with flame hardened grooves.
- Double row pre-adjusted sealed tapered bearings mounted on a steel shaft.
- Heavy center and side plates for proper support of center pin.
- Pre-assembled units for rapid attachment to crown assembly for installation on derrick.
- On multiple sheave assemblies, one sheave can be grooved for sand line on request.
- Other sizes available upon request.
- Sheaves manufactured to API-8C specifications.

APPLICATION AND WARNING INFORMATION
SECTION 17

Crown Blocks

Sheave Diameter (mm)	Model No.	Stock No.	No. of Sheaves	Working Load Limit (t)	Wire Rope Diameter (mm)	Weight Each (kg)
610	241	351158	1	13.5	22	91
610	242	351167	2	27	22	126
610	243	351176	3	40.5	22	170
610	731	351185	1	31.5	25	91
610	732	351194	2	67.5	25	159
610	733	351201	3	90	25	238
610	734	351210	4	113	25	327
762	741	351229	1	36	28	147
762	742	351238	2	72	28	254
762	743	351247	3	99	28	363
762	744	351256	4	126	28	445
762	745	351265	5	153	28	528

Marine Blocks

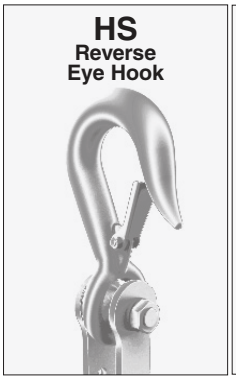
McKissick® Marine Blocks offer solutions for the unique application of marine environments.

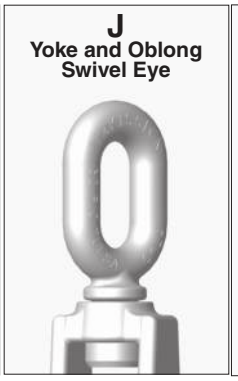
Where corrosion resistance is paramount, hot dip galvanized finishes are available as the best solution for saltwater or highly corrosive environments.

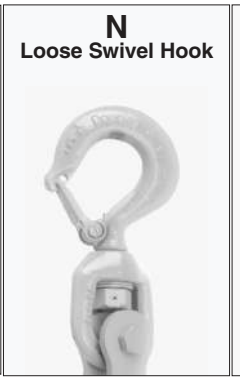
Blocks that follow have sheaves specifically grooved for certain rope types. Ensure that the correct block is specified for the type of rope being used.

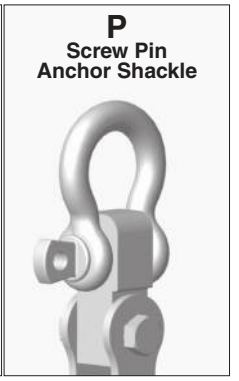
rope Types:

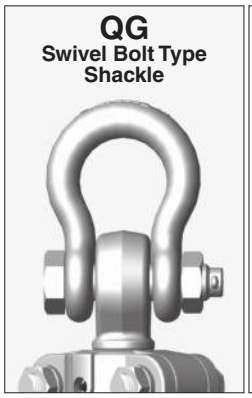
- Wire rope: Rope constructed of metal (most commonly steel) wires, twisted into strands that are laid in a helical pattern around a core.
- Natural Rope: Rope constructed of natural or plant based fibers, including manila, hemp, linen, cotton, coir, jute, and sisal.
- Synthetic Rope: Rope constructed of Synthetic or man-made fibers including polypropylene, nylon, polyesters, polyethylene, Aramids, and acrylics.

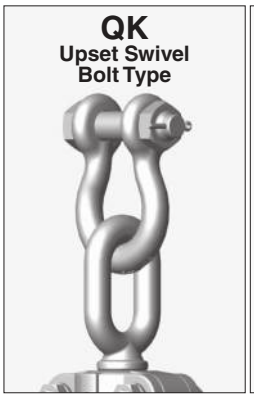


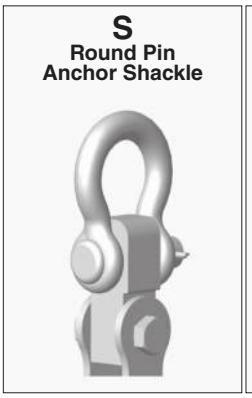


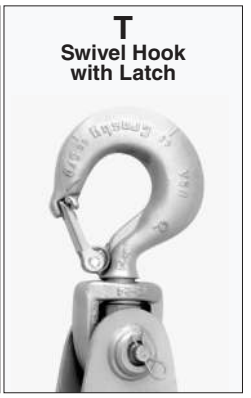












Regular Wood Blocks for Natural Manila Rope

HS-21-B

- Hot-dip Galvanized for corrosion resistance.
- Grade 5 bolts secured with lock washers and staked nuts.
- Bronze bushed sheaves with large bearing diameter for extended block life.
- Beckets furnished on all blocks.
- Meets or exceeds all requirements of ASME B30.26. Importantly, these blocks meet other critical performance requirements including fatigue life, impact properties and material traceability, not addressed by ASME B30.26.
- Fitting Type: HS-Latch Hook; N-Swivel Hook with Latch; S- Round Pin Anchor Shackle

21B, 22B, 23B

Block Size (in)	Fitting	Single Sheave 21 B Stock No.	Double Sheave 22 B Stock No.	Triple Sheave 23 B Stock No.
4	HS	603831	604634	605438
5	HS	603859	604652	605456
6	HS	603877	604670	605474
8	HS	603911	604714	605517
4	N	606437	606838	607230
5	N	606455	606856	607258
6	N	606473	606874	607276
8	N	606516	606918	607310
4	S	610039	611635	613232
5	S	610057	611653	613250
6	S	610075	611671	613278
8	S	610119	611715	613312

21B, 22B, 23B

Block Size (in)	Sheave Diameter	Manila Rope Size (mm)	Working Load Limit (t)			Weight Each (kg)		
			21 Single	22 Double	23 Triple	21 Single	22 Double	23 Triple
4	57.0	13	.45	.64	.82	.79	1.36	1.81
5	76.0	16	.54	.82	1.09	1.47	2.54	2.95
6	89.0	19	.82	1.13	1.45	2.27	3.86	5.22
8	121	22-26	1.27	1.72	2.18	5.90	6.35	9.75

4:1 Design Factor.

APPLICATION AND WARNING INFORMATION
SECTION 17

Steel Shell Blocks for Natural or Manila Rope

P-303B

- Hot-dip Galvanized for corrosion resistance.
- Grade 5 bolts secured with lock washers and staked nuts.
- Bronze bushed sheaves with large bearing diameter for extended block life.
- Fitting Type: HS- Latch Hook; N- Swivel Hook with Latch; P- Screw Pin Anchor Shackle

301B, 302B, 303B

Block Size (in)	Fitting	Single Sheave 301 B Stock No.	Double Sheave 302 B Stock No.	Triple Sheave 303 B Stock No.
4	HS	680971	681373	681774
6	HS	680999	681391	-
8	HS	681015	681417	681818
4	N	682639	683031	683433
6	N	682675	683077	683479
8	P	691111	692717	694314

301B, 302B, 303B

Block Size (in)	Sheave Diameter	Manila Rope Size (mm)	Working Load Limit (kg)			Weight Each (kg)		
			Single	Double	Triple	Single	Double	Triple
4	57.2	13	.50	.73	1.00	1.02	1.70	2.27
6	89.0	19	.91	1.50	1.81	2.49	4.20	5.67
8	121	26	1.50	2.31	3.18	4.54	7.48	9.98

3.5:1 Design Factor.

HS-262 Double

Loose Side Hooks with Latch for Manila Rope

- Grade 5 bolts secured with lock washers and staked nuts.
- Bronze bushed sheaves with large bearing diameter for extended block life.
- Fitting Type : HS - Latch Hook

HS-262 Double, HA-261, 262, 263

Block Size (in)	Fitting	Manila Rope Size (mm)	Sheave Diameter	261 B Stock No.	262 B Stock No.	263 B Stock No.	Working Load Limit (t)			Weight Each (kg)		
							261 Single	262 Double	263 Triple	261 Single	262 Double	263 Triple
4	HS	13	57.0	666826	666229	667228	.41	.64	.82	.63	1.46	1.47
5	HS	16	76.0	666844	666247	-	.54	.82	-	1.02	1.76	-
6	HS	19	89.0	666862	666265	-	.82	1.13	-	1.70	2.72	-
8	HS	22-26	121	666906	666309	667308	1.27	1.72	2.18	3.23	4.88	6.69

3:1 Design Factor.

APPLICATION AND WARNING INFORMATION
SECTION 17

T-350-C

Gin Blocks for Manila Rope

- For light hoisting by roofers and contractors.
- Furnished with drop forged swivel latch hooks.
- Equipped with swivel hook with latch.

APPLICATION AND WARNING INFORMATION
SECTION 17

350C, 350B, 350R

Block Size (in)	Gin Block Stock No.			Sheave Size (mm)			Manila Rope Size (mm)	Working Load Limit (t)	Weight Each (kg)
	T-350-B	T-350-R	T-350-C	Outside Diam.	Rim Thickness	Bearing Diam.			
8	710403	710207	710001	203	31.8	19.1	22	.45	4.10
10	710421	710225	710029	254	31.8	22.4	26	.45	5.45
12	710449	710243	710047	305	35.1	22.4	26	.45	7.25

3:1 Design Factor.

Bearing Code : B - Self Lubricating Bronze Bushed; R - Roller Bearing; C - Common Iron

STEEL SHELL & WOOD SHELL

T-390
Painted

T-390
Galvanized

T-385
Painted

T-385
Galvanized

- New style blocks feature higher working load limits.
- Painted or Galvanized steel with replaceable wood bumpers.
- Side plate opens for insertion of wire rope.
- Incorporates exclusive bolt retaining spring to assure no lost bolts, plus utilizes secondary retaining pin.
- Bronze bushed sheaves with large bearing diameter for extended block life.
- Utilizes Crosby "N" style hooks with integrated latch.
- Lubricated center pin.
- 10" and 12" sizes utilize steel sheaves.
- Meets or exceeds all requirements of ASME B30.26. Importantly, these blocks meet other critical performance requirements including fatigue life, impact properties and material traceability, not addressed by ASME B30.26.

APPLICATION AND WARNING INFORMATION
SECTION 17

385B, 390B Blocks

Block Size (in)	Fitting	Wood Shell		Steel Shell	
		385-B Stock No. S.C.	385-B Stock No. Galv.	390-B Stock No. S.C.	390-B Stock No. Galv.
6	T	702000	702108	702216	702324
8	T	702009	702117	702225	702333
10	T	702018	702126	702234	702342
12	T	702027	702135	702243	702351
6	J	702036	702144	702252	702360
8	J	702045	702153	702261	702369
10	J	702054	702162	702270	702378
12	J	702063	702171	702279	702387
6	G	702072	702180	702288	702396
8	G	702081	702189	702297	702405
10	G	702090	702198	702306	702414
12	G	702099	702207	702315	702423

385B, 390B Blocks

Sheave Diameter	Manila Rope Size (mm)	Working Load Limit (t)	Weight Each (kg)
76.2	19-22	1.8	3.18
102	26-29	3.6	5.90
152	32	7.3	11.3
203	38	7.3	15.4

4:1 Design Factor

N-411B

Blocks for Synthetic Fiber Rope with loose swivel hooks

- These blocks are built to carry the increased loads of synthetic fiber ropes.
- Self-lubricated bronze bushed sheaves with large bearing diameter for extended block life.
- Meets or exceeds all requirements of ASME B30.26. Importantly, these blocks meet other critical performance requirements including fatigue life, impact properties and material traceability, not addressed by ASME B30.26.
- Fitting Type: S- Round Pin Anchor; N- Swivel Hook Latch

411B, 412B, 413B

Block Size (in)	Fitting	411 B Stock No.	412 B Stock No.	413 B Stock No.
4	S	755105	755301	755506
6	S	755123	755329	755524
4	N	757103	757309	757504
6	N	757121	757327	757522

411B, 412B, 413B

Block Size (in)	Fitting	Sheave Diameter	Synthetic Rope Size (mm)	Working Load Limit (t)			Weight Each (kg)		
				Single	Double	Triple	Single	Double	Triple
4	S	57.2	13	.90	1.36	1.36	1.36	1.81	2.72
6	S	89.0	19	1.36	3.18	3.63	2.83	4.54	6.35
4	N	57.2	13	.91	1.36	1.36	1.36	1.81	2.72
6	N	89.0	19	1.36	1.81	2.72	2.83	4.54	6.35

4:1 Design Factor.

APPLICATION AND WARNING INFORMATION
SECTION 17

TRY NET BLOCKS

F-453 6”

F-454 6”

J-454 8”

- Forged steel swivel eyes.
- Hot-dip galvanized.
- 6" 453 - Pressed steel side plates with flared edges. Figure 8 grooved, self-lubricating bronze bushed sheaves, with pressure lube fittings. 453 has an extra wide throat opening to allow fittings to pass through.
- 6" 454 - Forged side plates designed to eliminate rope jamming. Wide throat opening and pressure lube fitting on sheave and eye fitting.
- 8" 454 - Forged steel side plates designed to eliminate possibility of rope jamming. Furnished with sealed tapered bearings. Flame-hardened forged steel sheaves for wear resistance.

APPLICATION AND WARNING INFORMATION
SECTION 17

453, 454, Blocks

Sheave Dia. and Model No.	Bearing Type	Stock No.	Working Load Limit (t)	Weight Each (kg)	Sheave Dimensions (mm)	
					Outside Diameter	Rim Thickness
6" F-453	Bronze Bushed	769886	4.54	15.9	152	70.0
6" F-454	Needle Bearing	2001763	4.54	10.4	152	70.0
8" J-454	Tapered Bearing	130726	9.07	16.3	203	73.0

4:1 Design Factor.

DOUBLE RIG TRAWL BLOCKS

J-452

Double Rig Trawl Blocks

- Steel sheave with flame hardened groove, for maximum wear under abrasive conditions.
- Double row, permanently sealed tapered roller bearings.
- Pressure lubrication throughout.
- All steel construction.
- Hot-dip Galvanized.
- Available in "J" oblong swivel eye and "F" standard swivel eye.

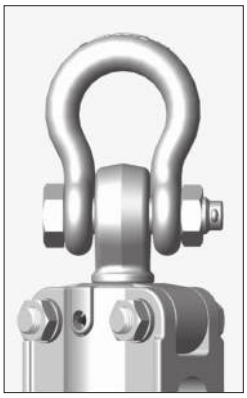
APPLICATION AND WARNING INFORMATION
SECTION 17

J-452 Blocks

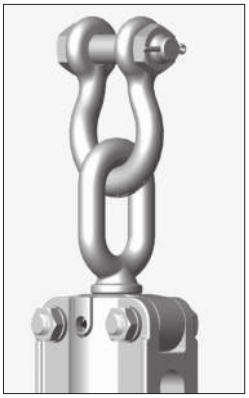
Sheave Dia. and Model No.	Stock No.	Working Load Limit (t)	Weight Each (kg)	Sheave Dimensions (mm)	
				Outside Diam.	Rim Thickness
8" J-452	130655	9.07	21.8	203	95.5
12" J-452	130673	9.07	38.6	305	95.5
16" F-452	130682	18.14	53.0	406	95.5
18" J-452	2015467	22.50	136	457	138
22" F-452	130708	27.22	109	559	95.5

4:1 Design Factor.

Marine Block Fitting Codes



QG
Swivel Bolt Type
Shackle



QK
Upset Swivel
Bolt Type

CARGO HOISTING BLOCKS

E-566
with Drilled
Swivel Eye

- Block is galvanized.
- Blocks 356mm and larger have flame-hardened roll forged sheaves that assure greater wire life.
- Roll forged sheave is fitted closely into mortise of shell so wire cannot jam between sheave and shell.
- Available for 19mm or 25mm wire.
- Block is fitted with tapered roller bearings which take both load and side thrusts and hold sheave central so it cannot chafe or wear on the sides.
- Tapered Roller bearing with neoprene seals and stainless steel center pin provide long life and trouble-free service.
- Stainless steel center pin has recessed nuts with lock washers.
- Swivel fitting has permanently sealed thrust bearing.
- Pressure lubrication fittings are standard on both center pin and swivel.
- Individually Proof Tested at 4 times Working Load or 2 times Resultant Load.
- A.B.S. recognized load test certificates are furnished.
- Cargo hoist blocks are rated by the maximum single line pull of the wire rope being used.
- Resultant Load equals 2 times single line pull. Ultimate load equals 5 times the Resultant Load.

J-566
with Oblong
Swivel Eye

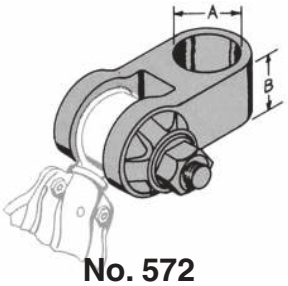
APPLICATION AND WARNING INFORMATION
SECTION 17

566 Hoisting Blocks

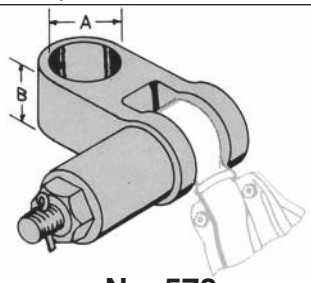
Sheave Size (mm)	E-566 Stock No.	J-566 Stock No.	QG-566 Stock No.	QK-566 Stock No.	Single Line Pull (t)	Wire Rope Diameter (mm)	Weight Each (kg)
305	775003	775209	775806	776002	4.54	19	43.1
356	775058	775254	775450	775655	4.54	19	45.4
356	775067	775263	775469	775664	9.07	25	45.4
406	776609	776672	776681	776690	9.07	19	59
406	752956	752965	752974	752983	9.07	25	59

5:1 Design Factor based on Resultant Load. Working Load equals maximum single line pull.

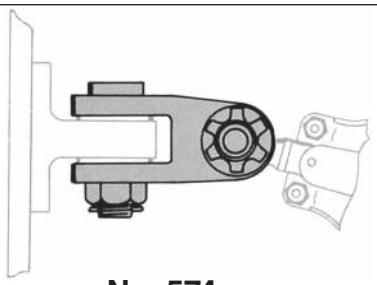
HEEL AND LEAD BLOCK ADJUSTER FITTINGS
(For use with E-566 Cargo Blocks)



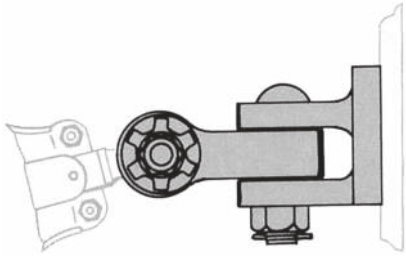
No. 572
Self-adjuster Fitting with Tension Pin, Cup Spring and Washers.



No. 573
Self-adjuster Fitting with Tension Pin, Coil Spring, Cup and Washers.

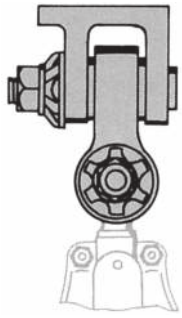


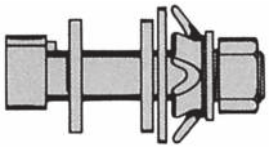
No. 574
Self-adjuster Fitting with Tension Pin, Cup Spring and Washers, and King Pin to fit Pad Eye (can also be furnished with 2 Tension Pins).



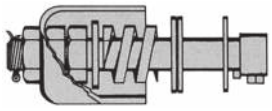
No. 576
Self-adjuster Fitting with Pad Jaw, King Pin, Tension Pin, Cup Spring and Washers.

No. 575
Self-adjuster Fitting with Tension Pin, Cup Spring, and Washer.





No. 571
Tension Pin with Cup Spring, Nut and Washers.



No. 570
Tension Pin with Coil Spring, Nut and Washers, Cotter and Cup.

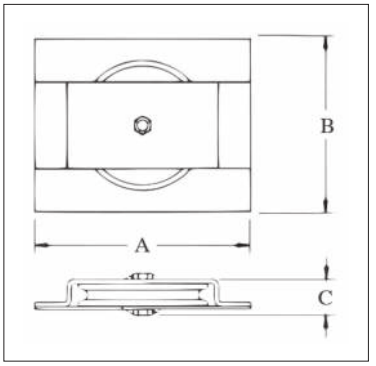
When ordering Specify: "A" - Pin Diameter, "B" -Height of Fitting, and Tension Pin Diameter.

15

S-600S

Horizontal Lead Blocks

- Available painted or galvanized.
- Fitted with steel sheaves.
- Self-lubricated Bronze Bushed.



S-600S / G-600S

Sheave Diameter (mm)	600 Series Stock No.		Resultant Working Load Limit (t)	Wire Rope Diameter (mm)	Weight Each (kg)	Dimensions (mm)		
	S-600-S Painted	G-600-S Galv.				A	B	C
152	771999	772006	1.81	10	5.6	279	162	63.5
203	772015	772024	2.27	13	9.5	330	216	76.0
254	772033	772042	2.72	16	16.3	381	267	82.5
305	772051	772060	3.63	19	27.7	432	318	102
356	772079	772088	4.54	22	43.0	483	368	102

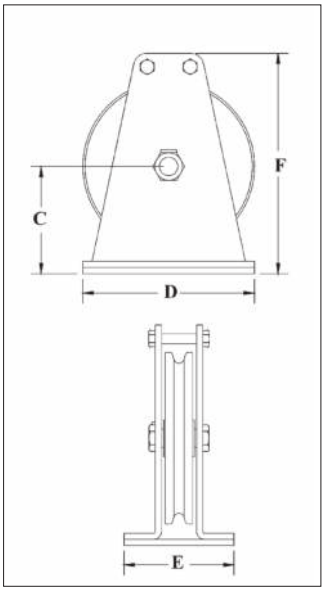
4:1 Design Factor

APPLICATION AND WARNING INFORMATION
SECTION 17

G-601S

Vertical Lead Blocks

- Available painted or galvanized.
- Fitted with steel sheaves.
- Self-lubricated Bronze Bushed.



S-601S / G-601S

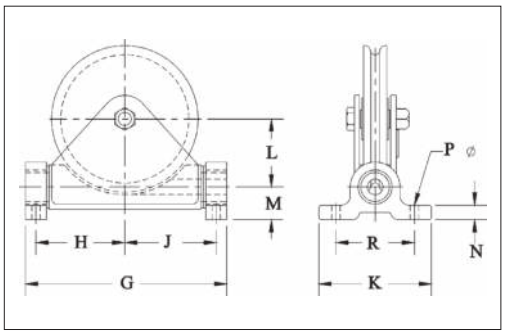
Sheave Diameter (mm)	601 Series Stock No.		Resultant Working Load Limit (t)	Wire Rope Diameter (mm)	Weight Each (kg)	Dimensions (mm)			
	S-601-S Painted	G-601-S Galv.				C	D	E	F
152	772195	772202	1.81	10	4.5	89	152	140	178
203	772211	772220	2.27	13	11.0	124	203	171	248
254	772239	772248	2.72	16	14.3	162	254	197	298
305	772257	772266	3.63	19	27.2	184	305	152	387
356	2003424	2003425	4.54	22	44.5	222	356	229	457

4:1 Design Factor.

G-602S

Flag Blocks

- Base plates are drilled.
- Available painted or galvanized.
- Fitted with steel sheaves.
- Self-lubricated Bronze Bushed.



S-602S / G-602S Flag Blocks

Sheave Diameter (mm)	602 Series Stock No.		Resultant Working Load Limit (t)	Wire Rope Diameter (mm)	Weight Each (kg)	Dimensions (mm)								
	S-602-S Painted	G-602-S Galv.				G	H	J	K	L	M	N	P	R
152	772391	772408	1.8	10	7.71	229	95.5	98.5	159	73.0	41.1	19.1	14.2	121
203	1420885	772426	2.2	13	14.3	289	121	130	178	92.0	51.0	25.4	17.5	140
254	772435	772444	2.7	16	19.1	340	145	154	178	117	51.0	25.4	17.5	140
305	772453	772462	3.6	19	52	438	184	197	273	137	79.0	35.1	20.6	191
356	772471	-	4.5	22	62	489	216	222	273	165	79.0	35.1	20.6	191

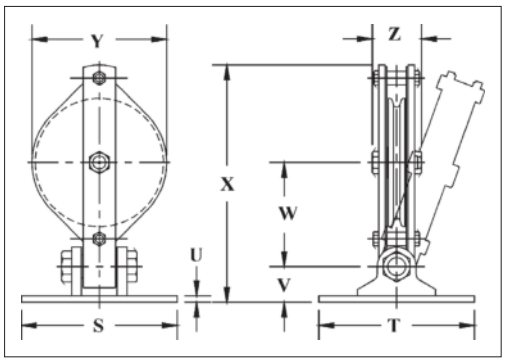
4:1 Design Factor.

APPLICATION AND WARNING INFORMATION
SECTION 17

S-603S

Hinged Lead Blocks

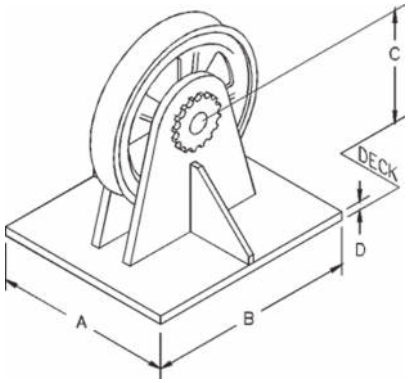
- Base plates are not drilled.
- Available painted or galvanized.
- Self-lubricated Bronze Bearings.



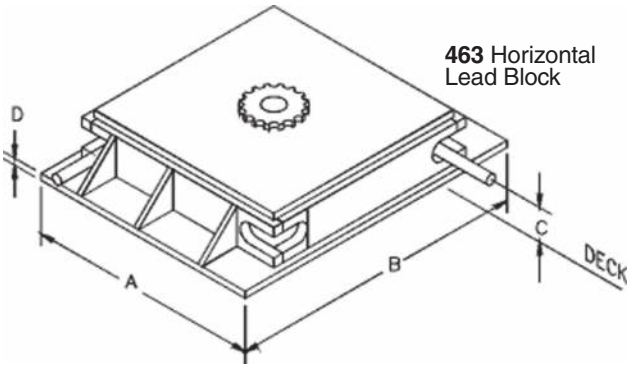
S-603S / G-603S Hinged Lead Blocks

Sheave Diameter (mm)	603 Series Stock No.		Resultant Working Load Limit (t)	Wire Rope Diameter (mm)	Weight Each (kg)	Dimensions (mm)							
	S-603-S Painted	G-603-S Galv.				S	T	U	V	W	X	Y	Z
152	772596	772603	1.81	10	13.6	152	114	12.7	51.0	148	325	171	82.5
203	772612	772621	2.27	13	15.4	203	171	9.65	66.5	167	393	229	95.5
254	772630	772649	2.72	16	20.4	305	305	12.7	70.0	203	464	273	111
305	772658	772667	3.63	19	34.0	305	305	12.7	70.0	241	473	330	116
356	772676	772685	4.54	22	45.4	305	305	12.7	70.0	273	524	381	122

4:1 Design Factor.



461 Vertical Lead Block



463 Horizontal Lead Block

Furnish the following important information when ordering:

- A,B and C dimensions.
- Line pull in pounds and degree of wrap.
- Line speed.
- Diameter of wire rope.
- Roller bearings, bronze bushings, or sealed double row tapered bearings.

- Guide and control your deck lines with McKissick's deck-mounted wire rope blocks. Built to your specific requirements.
- Extra heavy construction, built to withstand breaking strength of indicated rope (XIP, IWRC).
- Flame-hardened sheaves, machined grooves for proper rope size.
- For special requirements contact Crosby.

461 Vertical & 463 Horizontal Lead Blocks

Figure No.	Stock No.	Sheave Diameter (mm)	Wire Rope Diameter (mm)	Weight Each (kg)	Dimensions (mm)			
					A	B	C	D
461-18	239753	457	22	227	305	508	279	38.1
461-24	131574	610	32	227	381	660	356	38.1
461-26	238120	660	38	299	406	711	381	38.1
461-36	148389	914	42	386	508	914	495	50.8
461-40	136285	1016	50	910	584	1067	572	50.8
461-42	130753	1067	64	1814	711	1321	648	63.5
463-26	4440359	660	26	448	838	838	95.5	38.1
463-30	1404377	762	32	556	940	940	89.0	38.1
463-36	146522	914	38	862	1092	1092	89.0	38.1
463-42	1406525	1067	44	1350	1270	1270	111	51.0
463-48	131583	1219	50	1630	1397	1397	118	51.0
463-60	123164	1524	64	2900	1727	1727	146	51.0

For custom orders contact our Block Hotline, (1-800-727-1555).

OVAL PATTERN CONSTRUCTION BLOCKS

Q-681-Z

Q-682-Z

Q-683-Z

- All blocks are galvanized.
- Sheave lubricated through pressure lube fitting in center pin.
- Assembled with self lubricated bronze bushing.
- Combines weight of regular oval blocks with strength of extra heavy oval blocks.
- Assembled with bolt type anchor shackle.
- Side plates are rounded to provide additional stiffness and reduce wear and chaffing of the rope.

Q-681-Z / Q-682-Z / Q-683-Z

Block Size (in)	Stock No.Bronze Bushed Steel Sheaves		
	Q-681-Z	Q-682-Z	Q-683-Z
6	760441	760665	-
6	760452	760676	760812
8	760463	760687	760823
10	760474	760698	760834

Q-681-Z / Q-682-Z / Q-683-Z

Block Size (in)	Sheave Dimensions (mm)			Wire Rope Diameter (mm)	Working Load Limit (t)			Weight Each (kg)		
	Outside Diam.	Rim Thickness	Center Pin Dia.		Single	Double	Triple	Single	Double	Triple
6	152	25.4	19.1	10	2.70	3.63	-	6.8	12.7	14.5
6	152	25.4	19.1	13	2.70	3.63	4.50	7.3	12.7	14.5
8	203	31.8	25.4	16	3.63	5.44	-	13.2	20.4	28.1
10	254	31.8	25.4	16	3.63	6.35	7.25	17.2	27.7	36.3

4:1 Design Factor

Crosby

A NAME THAT ENCOMPASSES YEARS OF

ENGINEERING & MANUFACTURING EXCELLENCE





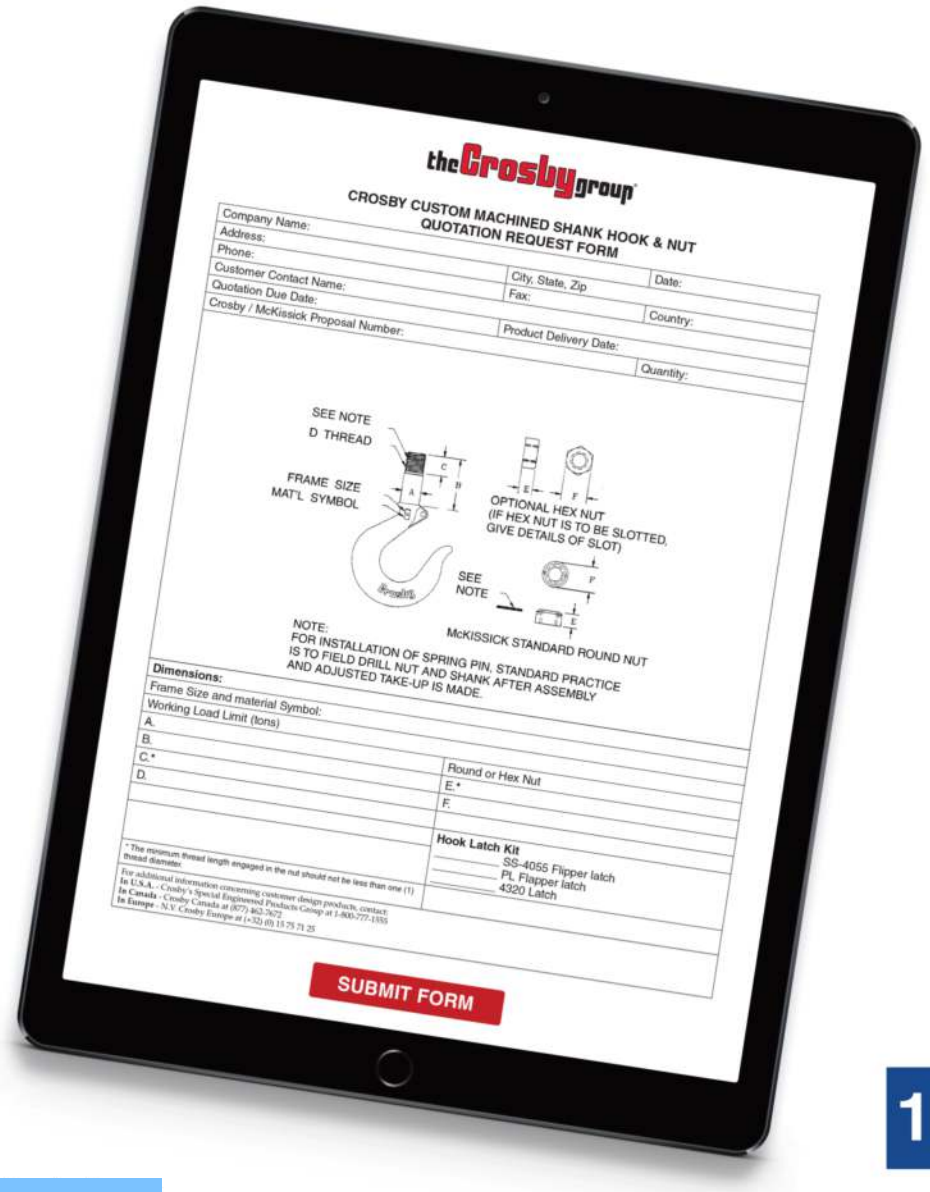


Whether you need a variation of a catalog item or a special designed solution for a challenging or unique application, The Crosby Group can help. By combining the experience of our technical support, research and development, engineering, and manufacturing teams, we are capable of designing and fabricating custom products for nearly any special application.

ENGINEERED SOLUTIONS

Special Request Forms

To submit a request for a custom product, please complete one of our special request forms online. Our Engineered Solutions group will review your request and follow up to discuss your project and next steps.



Superior sheaves to meet your most demanding applications

Every McKissick® Roll-Forged™ sheave starts as a single piece of AISI C-1035 carbon steel plate. Utilizing a time-proven proprietary roll forging process that adds extra strength to the critical groove section, the sheave is formed from a precision flame cut blank. The hub is then pressed into place with complete metal-to-metal contact and secured with a deep penetrating weld to ensure proper fit and longer life. Before the McKissick name is added, each sheave is thoroughly inspected to meet applicable industry and Crosby® quality standards.

	McKissick®	Cold-Formed Split-Steel
Smooth radius edge for better fit & less wear on rope	4	
Thicker fleet section for better support & stronger sheave groove	4	
Deep penetrating weld at hub for longer life	4	
Flame-hardened groove - Higher Rockwell C rating	35Rc	14Rc
Roll Forging process provides superior grain flow	4	

ELEMENTS OF A SUPERIOR SHEAVE

1 A smooth radius at the rim provides superior transition from outside diameter to groove, eliminating sharp corners that can damage rope. Cold-formed split-steel sheaves may contain a sharp transition radius at rim of sheave.

2 Size for size, McKissick Roll-Forged sheaves have a thicker section under the tread of the wire rope groove, providing more substantial support of the rope. Cold-formed split-steel sheaves are limited to a thinner section thickness under the groove, reducing sheave life in heavy service conditions. Thinner sections produce a sharp corner under the tread, resulting in potential stress risers.

3 Thicker web on the sheave provides required stiffness to support a stronger sheave that contains thicker flange sections. The thinner web on cold-formed split-steel sheaves, inherent to the process, does not support thicker flange sections. The sharp, pointed cutter used in forming the groove during the cold-formed split-steel process may produce a concealed crack in the bottom of the groove.

4 Heavier flange sections provide a much stronger wire rope groove and maintain proper consistent groove angles, ensuring long term wire rope performance. Cold-formed split-steel sheaves tend to have flange sections that are thinner as well as variations in thickness on the same sheave, resulting in less than desired performance during critical applications. Cold-formed split-steel sheaves are limited to a maximum flange thickness of 50% of web section.

5 Minimum 35Rc for higher hardness in the bottom of the groove results in less wear to the sheave, thus extending life of wire rope. Unless requested at time of order, cold-formed split-steel sheaves have a much lower hardness rating (approximately 14Rc). The standard material used in cold-formed split-steel process may not allow higher hardness in groove.

6 Precision alignment of hub with blank, then finished with a deep penetrating weld ensuring proper fit, longer life, and confidence during the most extreme of applications.

Additional important features: The grain flow associated with the McKissick Roll-Forged sheave process results in excellent performance properties, and each sheave is permanently marked with 'McKissick,' sheave outside diameter, wire rope size, and the Product Identification Code (PIC) to provide complete material traceability.

APPLICATIONS & WARNINGS

Read and understand these instructions before using products.



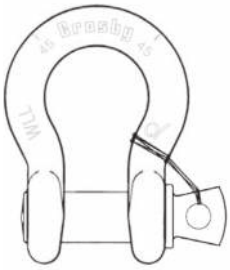
TABLE OF CONTENTS

Application Information

RIGGING PRACTICE SHACKLES

Screw pin shall be fully engaged. If designed for a cotter pin, it shall be used and maintained. Applied load should be centered in the bow to prevent side loading. Multiple sling legs should not be applied to the pin. If side loaded, the rated load shall be reduced according to Table 1 on the following page.

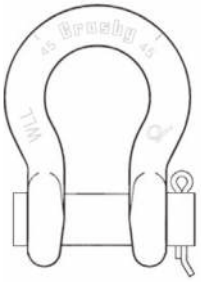
Screw Pin Shackles Pin Security



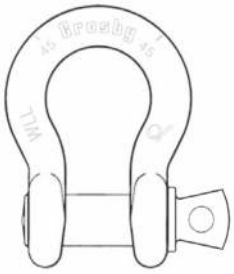
MOUSE SCREW PIN WHEN USED IN LONG-TERM OR HIGH-VIBRATION APPLICATIONS.

Mouse or Mousing (screw pin shackle) is a secondary securement method used to secure screw pin from rotation or loosening. Annealed iron wire is looped through hole in collar of pin and around adjacent leg of shackle body with wire ends securely twisted together.

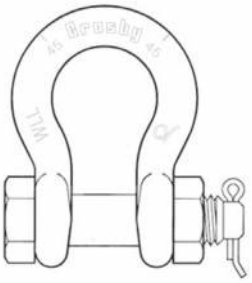
Shackles



ROUND PIN
Do not side load, do not use as a collector ring, always use cotter pin.



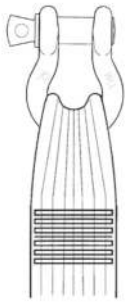
SCREW PIN
Use when picking and placing a load, tighten pin prior to each lift.



BOLT-TYPE
Use in permanent or long-term installations, always use nut and cotter.

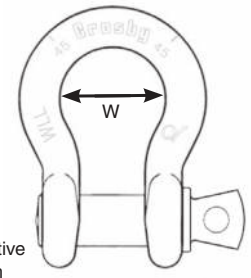
Connection of Slings to Shackles

Diameter of shackle must be greater than wire rope diameter if no thimble in eye.



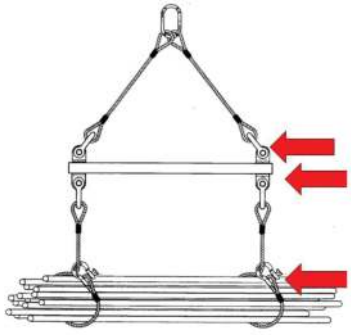
Shackle must be large enough to avoid pinching of synthetic slings.

Note that the effective width of the curved surface is only 75% of width.



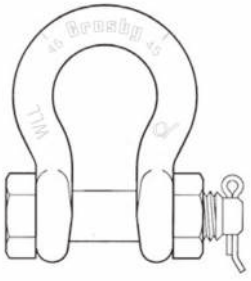
Effective Width = .75 x W

Bolt-Type Shackles

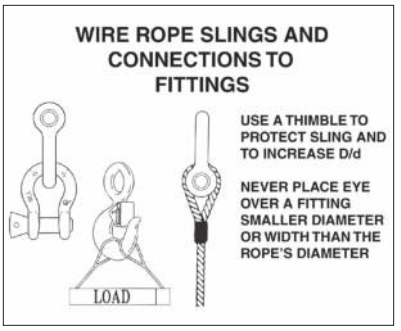


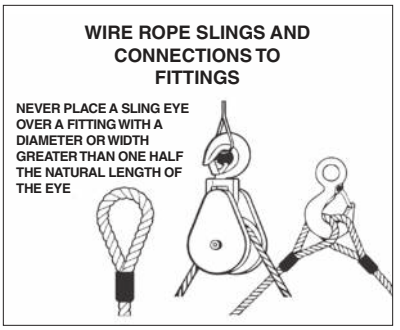
Use Bolt-Type Shackle for permanent or long-term connection.

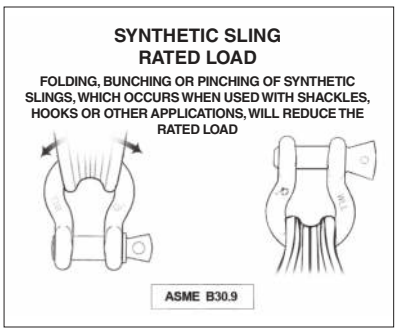
Use Screw Pin Shackle for temporary connection.

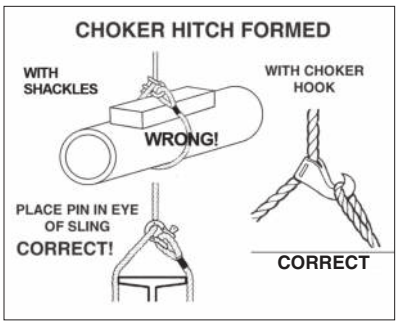


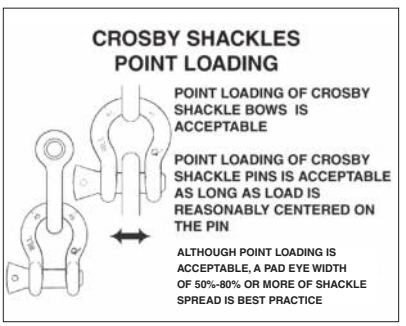
Not necessary to tighten nut. Always use cotter pin.











Installation Guidelines

1. Extended prong cotter pins should be inserted into hole until the head is tangent to the bolt/pin, and oriented so the axis of the eye is parallel to the shank of the bolt/pin.
2. The prongs are to be bent in opposite directions around the bolt or pin as shown in Figure 1 below.
3. After installation, the cotter pin prongs should wrap around the bolt or pin by at least 60 degrees opposite directions of bolt or pin diameter.
4. The prongs may be bent with pliers or by gently tapping with a hammer. *Note: Avoid bending the prongs over sharp radii which may promote breakage. If a prong breaks off or becomes damaged during installation, replace the cotter pin.
5. The ends of the prongs may be curled to form a small loop to reduce the potential for snagging or puncture wounds.

Cotter Pin Sizes For Crosby Shackles

213 & 215 SHACKLES	
SHACKLE SIZE	COTTER PIN SIZE
1/4”	3/32 x 3/4”
5/16”	3/32 x 1”
3/8”	1/8 x 1”
7/16”	1/8 x 1”
1/2”	1/8 x 1”
5/8”	3/16 x 1 1/4”
3/4”	3/16 x 1 1/4”
7/8”	5/16 x 1 1/2”
1”	5/16 x 1 3/4”
1 1/8”	5/16 x 1 3/4”
1 1/4”	5/16 x 2”
1 3/8”	5/16” x 2 1/4”
1 1/2”	5/16” x 2 1/4”
1 3/4”	5/16” x 2 3/4”
2”	3/8 x 3”

2140 SHACKLES	
SHACKLE SIZE	COTTER PIN SIZE
1 1/2”	5/16” x 2 1/4”
1 3/4”	5/16” x 2 3/4”
2”	3/8” x 3”
2 1/2”	7/16” x 4”
3”	3/8” x 4 1/2”
3 1/2”	3/8” x 4 1/2”
4”	3/8” x 4 1/2”
4 3/4”	3/8” x 7”
5”	3/8” x 8”
6”	3/8” x 8 1/2”
7”	3/8” x 10 1/2”
7 1/2”	3/8” x 10 1/2”
8”	3/8” x 13 1/2”

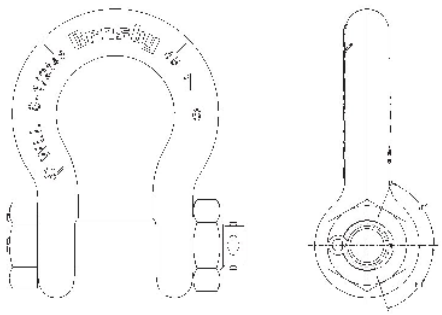


Figure 1
Cotter pin installation in a 1" bolt type shackle.

2130 & 2150 SHACKLES	
SHACKLE SIZE	COTTER PIN SIZE
3/16”	3/32 x 3/4”
1/4”	3/32 x 3/4”
5/16”	3/32 x 1”
3/8”	1/8 x 1”
7/16”	1/8 x 1”
1/2”	1/8 x 1”
5/8”	3/16 x 1 1/4”
3/4”	3/16 x 1 1/4”
7/8”	1/4 x 1 1/2”
1”	1/4 x 1 3/4”
1 1/8”	1/4 x 1 3/4”
1 1/4”	1/4 x 2”
1 3/8”	5/16 x 2 1/4”
1 1/2”	5/16 x 2 1/4”
1 3/4”	5/16 x 2 3/4”
2”	3/8 x 3”
2 1/2”	7/16 x 4”
3”	3/8 x 4 1/2”
3 1/2”	3/8 x 4 1/2”
4”	3/8 x 4 1/2”

2160 SHACKLES	
SHACKLE WLL (t)	COTTER PIN SIZE
7	3/16” x 1 1/4”
12-1/2	1/4” x 1 3/4”
18	1/4” x 2”
30	5/16 x 2 1/4”
40	5/16” x 2 3/4”
55	3/8” x 3”
75	3/8” x 3”
125	3/8” x 4”
200	1/2” x 5 1/4”
300	5/8” x 6”
400	5/8” x 8”
500	3/4” x 9”
600	3/4” x 10”
700	3/4” x 11”
800	3/4 x 13” R3
900	3/4” x 13”
1000	3/4” x 14”
1250	3/4” x 15”
1500R3	3/4” x 17”
4	3/8 x 4 1/2”

Application Information

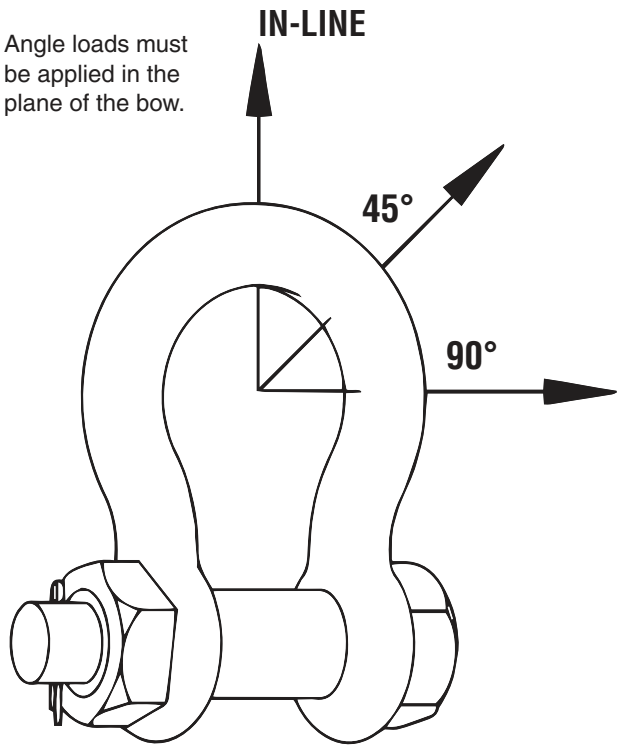
Point Loading of Crosby® Shackles

It has been determined that all Crosby® shackles can be point-to-point loaded to the Working Load Limit without bending of the pin/bolt. This loading can be bow-to-bow, bow-to-pin, or pin-to-pin (if there is not interference between the diameter of the shackle ears). However, caution should be given to maintain the load at the center of the span by spacers so the load will not slide over to one side, and overload that ear. See "Off Center Loading Of Crosby® Screw Pin & Bolt Type Shackles – 3/16" to 3" Sizes".

Angular Loading Of Crosby® Screw Pin & Bolt Type Shackles

Crosby® has made representative tests with smaller size shackles with the load applied at 90 degrees to the normal plane of loading (ie. in-line). The test results indicated that in order to maintain a proof load of 2 times the Working Load Limit (2 x WLL), the Working Load Limit should be reduced to 50% (ie. one-half the catalog working load rating). DO NOT SIDE LOAD G/S-213 OR G/S-215 ROUND PIN SHACKLES. Calculations based on the above test indicates the Working Load Limit should be reduced as shown below for loads applied at various angles to the normal plane of loading:

Angle loads must be applied in the plane of the bow.



SIDE LOADED RATING REDUCTION TABLE FOR 3/16" - 3" (120 METRIC TONS)

Table 1

Side Loading Reduction Chart for Screw Pin and Bolt Type Shackles Only+

Angle of Side Load from Vertical In-Line of Shackle	Adjusted Working Load Limit
0° - 10° In-Line*	100% of Rated Working Load Limit
11°- 20° from In-Line*	85% of Rated Working Load Limit
21°- 30° from In-Line*	75% of Rated Working Load Limit
31°- 45° from In-Line*	70% of Rated Working Load Limit
46°- 55° from In-Line*	60% of Rated Working Load Limit
56°- 70° from In-Line*	55% of Rated Working Load Limit
71°- 90° from In-Line*	50% of Rated Working Load Limit

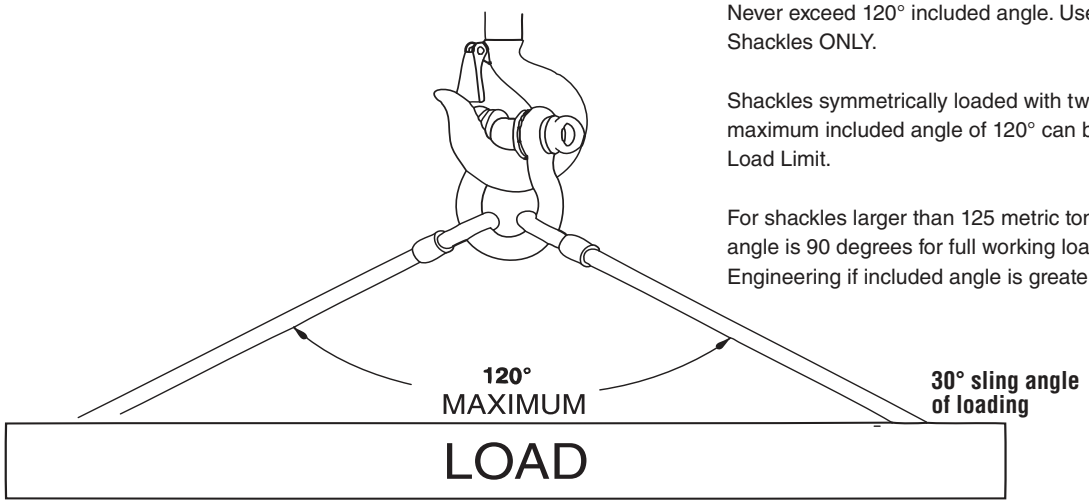
+ In-Line load is applied perpendicular to pin. *** DO NOT SIDE LOAD ROUND PIN SHACKLE.**

Table 1

SHACKLE SIZE GREATER THAN 3" ANGLE FROM IN-LINE (DEGREES)	REDUCTION IN WLL
0° - 5° In-Line*	0% of Rated Working Load Limit
6°- 10° from In-Line*	15% of Rated Working Load Limit
>10° from In-Line*	ANALYSIS REQ'D.

For shackles larger than 125 metric tons, where the angle of the side load is greater than 5 degrees, contact Crosby Engineering.

INCLUDED ANGLE - SHACKLES



Never exceed 120° included angle. Use Bolt Type and Screw Pin Shackles ONLY.

Shackles symmetrically loaded with two leg slings having a maximum included angle of 120° can be utilized to full Working Load Limit.

For shackles larger than 125 metric tons, the maximum included angle is 90 degrees for full working load limit. Contact Crosby Engineering if included angle is greater than 90 degrees.

For shackles larger than 125 metric tons, the maximum included angle is 90 degrees for full working load limit. Contact Crosby Engineering if included angle is greater than 90 degrees.

Application Information

Round Pin Shackles

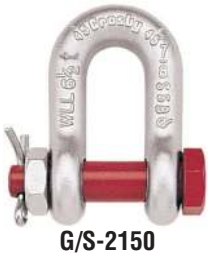
G/S-213

G/S-215

Round Pin Shackles can be used in tie down, towing, suspension or lifting applications where the load is strictly applied in-line. Round pin shackles should never be used in rigging applications to gather multiple sling legs, or where side loading conditions may occur.

Bolt-Type Shackles

G/S-2130



G/S-2150

G/S-2140

G/S-2160

G-2140E

Screw Pin Shackles

G/S-209

S-209T

G-209A

G/S-210

S-253

G-2169

Screw Pin Shackles are used in Pick and Place* applications. For permanent or long-term installations, Crosby recommends the use of bolt type shackles.

If you choose to disregard Crosby's recommendation, the screw pin shall be secured from rotation or loosening .

Screw pin shackles can be used for applications involving side-loading circumstances. Reduced working load limits are required for side-loading applications. While in service, do not allow the screw pin to be rotated by a live line, such as a choker application.

* Pick and Place application: Pick (move) a load and place as required. Tighten screw pin before each pick.

Bolt-Type Shackles can be used in any application where round pin or screw pin shackles are used. In addition, they are recommended for permanent or long term installations and where the load may slide on the shackle pin causing the pin to rotate. The bolt-type shackle's secondary securement system, utilizing a nut and cotter, eliminates the requirement to tighten nut before each lift or movement of load.

QUIC-CHECK®

All Crosby Shackles, with the exception of 2160, 2169, 2170, 252 and 253 styles incorporate markings forged into the product that address an easy to use **QUIC-CHECK®** feature. Angle indicators are forged into the shackle bow at 45 degree** angles from vertical. These are utilized on screw pin and bolt type shackles to quickly check the approximate angle of a two-legged hitch, or quickly check the angle of a single leg hitch when the shackle pin is secured and the pull of the load is off vertical (side loaded), thus requiring a reduction in the working load limit of the shackle.

G-2130

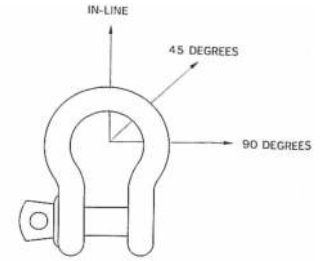
** **Round Pin Shackles** utilize the 45 degree **QUIC-CHECK®** indicators to ensure load is applied strictly in-line.

Technical Information

2006/42/EC highlights the responsibility of the manufacturer, distributor and end user of lifting gear. Gunnebo Industries shackles are specified, monitored and documented in compliance with the most stringent requirements for the product concerned. A certified ISO 9001:2008 to 9001:2015 system is an evidence of our quality standard. See website or user instructions for assembly instructions. Meets listed current specifications and standards at time of publication of this catalog.

Instructions For Safe Use

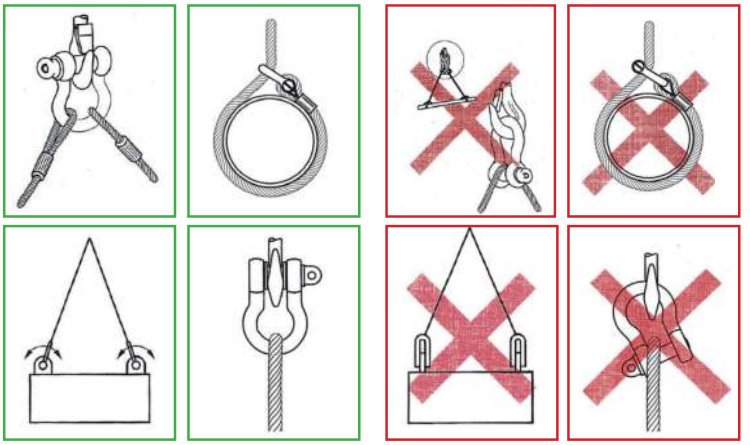
1. The user is obliged to keep a valid Test Certificate for any shackle being used in a lifting operation.
2. Before use each shackle should be inspected to ensure that:
   - all markings in the body and the pin of the shackle are legible and in compliance with the relevant Test Certificate.
   - the shackle pin is of the correct type.
   - the body and pin are not distorted or unduly worn.
   - The body and pin are free from nicks, cracks, grooves and corrosion.
   - If there is any doubt with regards to the above criteria being met, the shackle should not be used for a lifting operation.
3. It is important to ensure that the pin is safely locked after assembly. For repeated lifting between inspections of the gear, it is recommended to use a safety bolt type shackle with nut and split-pin - the user must ensure that the split-pin is fitted, to prevent the nut from unscrewing during use.
4. Incorrect seating of a pin may be due to a bent pin, damaged threads or misalignment of the holes. Do not use the shackle under these circumstances, but refer the matter to a competent person (i.e. dealer, manufacturer)
5. Shackles should be fitted to the load in a manner that allows the shackle body to take the load in a straight line along its centerline to avoid undue bending stresses which will reduce the load capacity of the shackle. When using shackles in conjunction with multi-leg slings, due consideration should be given to the effect of the angle between the sling legs. When a shackle is used to secure the top block of a set of block and tackle the load on this shackle is increased by the value of the hoisting effect.
6. To avoid eccentric loading of the shackle it is recommended to center load on pin. as far as possible over the total length of the pin or to use loose spacers.
7. Never modify, repair or reshape a shackle by welding, heating or bending as this will affect the nominal WLL.
8. Never heat treat a shackle as this may affect the WLL.



Side loads should be avoided as the products are not designed for this purpose. If side loads cannot be avoided, the following reduction factors must be taken into account:

Reduction for side loading

Load angle	New Working Load Limit
0°	100% of original WLL
45°	70% of original WLL
90°	50% of original WLL



Avoid applications where, due to load movement, the shackle pin can rotate

Shackle must be loaded in straight direction

Temperature

If extreme temperature situations are applicable, the following load reductions must be taken into account.

Reduction for elevated temperatures

Temperature:	New Working Load Limit
-20 - 200° C	100% of original Working Load Limit
200 - 300° C	90% of original Working Load Limit
300 - 400° C	75% of original Working Load Limit
> 400° C	not allowed

Crosby® HOIST HOOKS

WARNINGS & APPLICATION INSTRUCTIONS

S-3319 Series Positioning Only | S-319 Series | S-3316 Series | L-320N Series | L-322 Series Positioning Only | L-3322B

⚠ WARNING

- **Loads may disengage from hook if proper procedures are not followed.**
- **A falling load may cause serious injury or death.**
- **See OSHA Rule 1926.1431(g)(1)(i)(A) and 1926.1501(g)(4)(iv)(B) for personnel hoisting by cranes and derricks, and OSHA Directive CPL 2-1.36 - Interim Inspection Procedures During Communication Tower Construction Activities. A Crosby 319, L-320 or L-322 hook with a PL latch attached and secured with a bolt, nut and cotter pin (or toggle pin) may be used for lifting personnel. A Crosby 319N, L-320N or L-322N hook with an S-4320 latch attached and secured with cotter pin or bolt, nut and pin; or a PL-N latch attached and secured with toggle pin may be used for lifting personnel. A hook with a Crosby SS-4055 latch attached shall NOT be used for personnel lifting.**
- **See OSHA Directive CPL 2-1.36 - Crosby does not recommend the placement of lanyards directly into the positive locking Crosby hook when hoisting personnel. Crosby requires that all suspension systems (vertical lifelines / lanyard) shall be gathered at the positive locked load hook by use of a master link, or a bolt-type shackle secured with cotter pin.**
- **Threads may corrode and/or strip and drop the load.**
- **Remove securement nut to inspect or to replace L-322, S-3316, and S-3319 bearing washers (2).**
- **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.**

QUIC-CHECK® Hoist hooks incorporate markings forged into the product which address two (2) **QUIC-CHECK®** features:

1. **Deformation Indicators –** Two strategically placed marks, one just below the shank or eye and the other on the hook tip, which allows for a **QUIC-CHECK®** measurement to determine if the throat opening has changed, thus indicating abuse or overload.
2. **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 criteria, the hook should be inspected further for possible damage.

QUIC-CHECK®

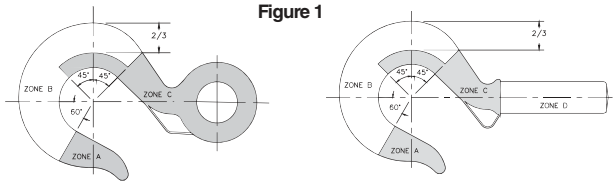
3. **Angle Indicators** – Indicates the maximum included angle which is allowed between two (2) sling legs in the hook. These indicators also provide the opportunity to approximate other included angles between two sling legs.

IMPORTANT SAFETY INFORMATION - READ & 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 ASME B30.10.

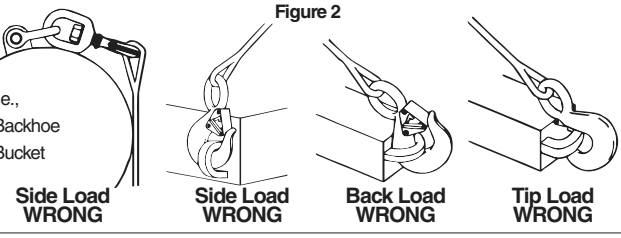
- For hooks used in frequent load cycles or pulsating loads, the hook and threads should be periodically inspected by Magnetic Particle or Dye Penetrant (Note: Some disassembly may be required).
- Never use a hook whose throat opening has been increased, or whose tip has been bent more than 10 degrees 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.
- Any crack in a hook is reason to take it out of service. Hooks with a nick or gouge can be repaired only by a qualified person by grinding lengthwise, following the contour of the hook, provided that the reduced dimension is within the limits shown in Figure 1. Contact Crosby Engineering to evaluate any crack.
- Never repair, alter, rework, or reshape a hook by welding, heating, burning, or bending.
- Never side load, back load, or tip load a hook.(Side loading, back loading and tip loading are conditions that damage and reduce the capacity of the hook.) (See Figure 2)
- Eye, Shank and Swivel hooks are designed to be used with wire rope or chain. Clevis hooks are design to be used with chain. Efficiency of assembly may be reduced when used with synthetic material.
- Do not swivel the L-322, S-3316, or S-3319 swivel hooks while supporting a load. These hooks are distinguishable by hex nuts and flat washers.
- The L-3322 swivel hook is designed to rotate under load. The L-3322 is distinguishable from the L-322 by use of a round nut designed to shield bearing.
- The frequency of bearing lubrication on the L-3322 depends upon frequency and period of product use as well as environmental conditions, which are contingent upon the user's good judgment.
- The use of a latch may be mandatory by regulations or safety codes; e.g., OSHA, MSHA, ANSI/ASME B30, Insurance, etc. (Note: When using latches, see instructions in "Understanding The Crosby Group Warnings" for further information.)
- Always make sure the hook supports the load (See Figure 3). The latch must never support the load (See Figure 4).
- When multileg slings are placed in the base (bowl/saddle) of the hook, the maximum included angle between sling legs shall be 90 deg. The maximum sling leg angle with respect to the hook centerline for any rigging arrangement shall be 45 degrees. A collector ring, such as a link or shackle, should be used to maintain in-line load when more than two legs are placed in a hook or for angles greater than 45 degrees with respect to hook centerline. When more than two legs are placed in the hook bunching of the legs shall be avoided.
- See ASME B30.10 "Hooks" for additional information.

Figure 1



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

Figure 2



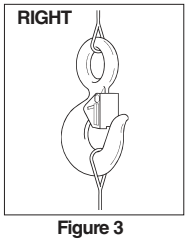


Figure 3

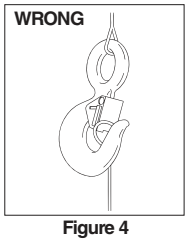


Figure 4

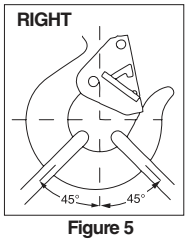


Figure 5

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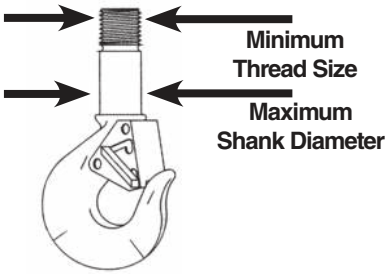
READ AND UNDERSTAND THESE INSTRUCTIONS BEFORE USING HOOKS
IMPORTANT – BASIC MACHINING AND THREAD INFORMATION

- Wrong thread and/or shank size can cause stripping and loss of load.
- The maximum diameter is the largest diameter, after cleanup, that could be expected after allowing for straightness, pits, etc.
- All threads must be Class 2 or better.
- The minimum thread length engaged in the nut should not be less than one (1) thread diameter. Install a properly sized retention device to secure the nut to the hook shank after the nut is properly adjusted at assembly. Nut retention devices such as set screws or roll pins are suitable for applications using anti-friction thrust bearings or bronze thrust washers. If the hook is intended for other applications that introduce a higher torque into the nut, a more substantial retaining device may be required.
- Hook shanks are not intended to be swaged on wire rope or rod.
- Hook shanks are not intended to be drilled (length of shank) and internally threaded.
- Crosby can not assume responsibility for, (A) the quality of machining, (B) the type of application, or (C) the means of attachment to the power source or load.
- Consult the Crosby Hook Identification & Working Load Limit Chart (See below) for the minimum thread size for assigned Working Load Limits (WLL).†
- Remove from service any Hook which has threads corroded more than 20% of the nut engaged length.



CROSBY HOOK IDENTIFICATION & WORKING LOAD LIMIT CHART†

Hook Identification			Working Load Limit (t)					Frame Size	Maximum Shank Diameter after Machining (mm)	Minimum Thread Size	
319C 319CN L-320C L-320CN L-322C L-322CN	319AN L-320A L-320AN L-322A L-322AN 3319 L-3322B	319BN	319C 319CN L-320C L-320CN L-322C L-322CN	319A 319AN L-320A L-320AN L-322A L-322AN L-3322B	319BN	S-3319	S-3316			319C 319CN (Carbon)	319A 319AN (Alloy)
DC	DA	DB	.75	1	.5	—	—	D	13.5	M12 x 1.25	M12 x 1.25
FC	FA	FB	1	1.5	.6	—	.45	F	15.7	M16 x 2	M16 x 2
GC	GA	GB	1.5	2	1	—	—	G	16.8	M16 x 2	M16 x 2
HC	HA	HB	2	3	1.4	1.63	.91	H	20.6	M18 x 1.5	M18 x 1.5
IC	IA	IB	3	*4.5 / 5	2.0	2.5	—	I	26.2	M22 x 2.5	M22 x 2.5
JC	JA	JB	5	7	3.5	4.5	—	J	32.3	M27 x 2	M27 x 2
KC	KA	KB	7.5	11	5.0	—	—	K	38.6	M30 x 1.5	M30 x 1.5
LC	LA	LB	10	15	6.5	—	—	L	44.5	M40 x 1.5	M40 x 1.5
NC	NA	NB	15	22	10	—	—	N	50.8	M50 x 1.5	M50 x 1.5
OC	OA	—	20	30	—	—	—	O	63.5	M56 x 2	M56 x 2
PC	PA	—	25	37	—	—	—	P	88.9	M70 x 1.5	M70 x 1.5
SC	SA	—	30	45	—	—	—	S	88.9	M75 x 1.5	M75 x 1.5
TC	TA	—	40	60	—	—	—	T	101.6	M85 x 2	M90 x 2
UC	UA	—	50	75	—	—	—	U	114.3	M95 x 2	M100 x 2
—	WA	—	—	100	—	—	—	W	155.4	—	M120 x 2
—	XA	—	—	150	—	—	—	X	162.1	—	M140 x 2
—	YA	—	—	200	—	—	—	Y	177.8	—	M160 x 2
—	ZA	—	—	300	—	—	—	Z	218.9	—	M190 x 2

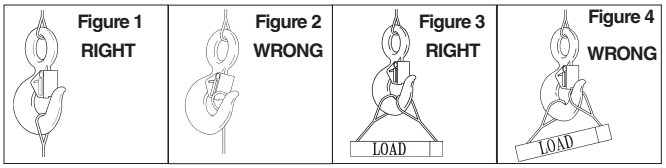
* 319AN, L-320AN, L-3322 and L-322AN are rated at 5 tons.

† Working Load Limit - The maximum mass or force which the product is authorized to support in general service when the pull is applied in-line, unless noted otherwise, with respect to the centerline of the product. This term is used interchangeably with the following terms: 1. WLL, 2. Rated Load Value, 3. SWL, 4. Safe Working Load, 5. Resultant Safe Working Load.

Warning and Application Instructions For Crosby® Hook Latch Kit

IMPORTANT SAFETY INFORMATION - READ & FOLLOW

- Always inspect hook and latch before using.
- Never use a latch that is distorted or bent.
- Always make sure spring will force the latch against the tip of the hook.
- Always make sure hook supports the load. The latch must never support the load (See Figures 1 & 2).
- When placing two (2) sling legs in hooks, make sure the angle between the legs is less the 90° and if the hook or load is tilted, nothing bears against the bottom of this latch (See Figures 3 & 4).
- Latches are intended to retain loose sling or devices under slack conditions.
- Latches are not intended to be an anti-fouling device.



⚠ WARNING

- **Loads may disengage from hook if proper procedures are not followed.**
- **A falling load may cause serious injury or death.**
- **See OSHA Rule 1926.1431(g)(1)(i)(A) and 1926.1501(g)(4)(iv)(B) for personnel hoisting for cranes and derricks. Only a Crosby or McKissick hook with a PL Latch attached and secured with bolt, nut and cotter (or Crosby Toggle Pin) or a Crosby hook with a S-4320 Latch attached and secured with a cotter pin, or a Crosby SHUR-LOC® hook in the locked position may be used for any personnel hoisting. A hook with a Crosby SS-4055 latch attached shall NOT be used for personnel lifting.**
- **Hook must always support the load. The load must never be supported by the latch.**
- **DO NOT use this latch in applications requiring non-sparking.**
- **Read and understand these instructions before using hook and latch.**

McKissick® HOIST HOOKS

WARNINGS & APPLICATION INSTRUCTIONS

L-320N Series

S-319 Series

L-322 Series Positioning Only

L-3322B Series

⚠ WARNING

- **Loads may disengage from hook if proper procedures are not followed.**
- **A falling load may cause serious injury or death.**
- **See OSHA Rule 1926.1431(g)(1)(i)(A) and 1926.1501(g)(4)(iv)(B) for personnel hoisting by cranes and derricks, and OSHA Directive CPL 2-1.36 - Interim Inspection Procedures During Communication Tower Construction Activities. A Crosby 319, L-320 or L-322 hook with a PL latch attached and secured with a bolt, nut and cotter pin (or toggle pin) may be used for lifting personnel. A Crosby 319N, L-320N or L-322N hook with an S-4320 latch attached and secured with cotter pin or bolt, nut and pin; or a PL-N latch attached and secured with toggle pin may be used for lifting personnel. A hook with a Crosby SS-4055 latch attached shall NOT be used for personnel lifting.**
- **See OSHA Directive CPL 2-1.36 - Crosby does not recommend the placement of lanyards directly into the positive locking Crosby hook when hoisting personnel. Crosby requires that all suspension systems (vertical lifelines / lanyard) shall be gathered at the positive locked load hook by use of a master link, or a bolt-type shackle secured with cotter pin.**
- **Threads or Split-Nut may corrode and/or strip and drop the load.**
- **Remove securement nut to inspect or to replace S-322 and S-3319 bearing washers (2).**
- **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.**

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 tip, which allows for a **QUIC-CHECK®** measurement to determine if the throat opening has changed, thus indicating abuse or overload.

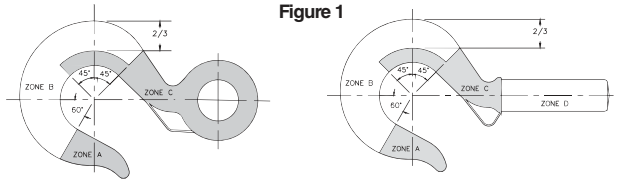
QUIC-CHECK®

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 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.

IMPORTANT SAFETY INFORMATION - READ & 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 ASME 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.
- Any crack in a hook is reason to take it out of service. Hooks with a nick or gouge can be repaired only by a qualified person by grinding lengthwise, following the contour of the hook, provided that the reduced dimension is within the limits shown in Figure 1. Contact Crosby Engineering to evaluate any crack.
- Remove from service any hook which has threads corroded more than 20% of the nut engagement length.
- Never repair, alter, rework, or reshape a hook by welding, heating, burning, or bending.
- Never side load, back load, or tip load a hook.(Side loading, back loading and tip loading are conditions that damage and reduce the capacity of the 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 L-322 or S-3319 swivel hooks while supporting a load. These hooks are distinguishable by hex nuts and flat washers.
- The L-3322 swivel hook is designed to rotate under load. The L-3322 is distinguishable from the L-322 by use of a round nut designed to shield bearing.
- The frequency of bearing lubrication on the L-3322 depends upon frequency and period of product use as well as environmental conditions, which are contingent upon the user's good judgment.
- The use of a latch may be mandatory by regulations or safety codes; e.g., OSHA, MSHA, ASME B30, Insurance, etc.. (Note: When using latches, see instructions in "Understanding: The Crosby Group Warnings" for further information.)
- Always make sure the hook supports the load (See Figure 3). The latch must never support the load (See Figure 4).
- When multileg slings are placed in the base (bowl/saddle) of the hook, the maximum included angle between sling legs shall be 90 deg. The maximum sling leg angle with respect to the hook centerline for any rigging arrangement shall be 45 degrees. A collector ring, such as a link or shackle, should be used to maintain in-line load when more than two legs are placed in a hook or for angles greater than 45 degrees with respect to hook centerline. When more than two legs are placed in the hook bunching of the legs shall be avoided.
- Reference Crosby's Hoist Hook Warning and Application Information for basic machining and minimum thread size.
- See ASME B30.10 "Hooks" for additional information.

Figure 1



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

Figure 2

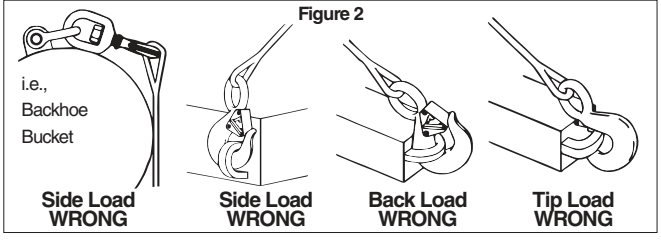


Figure 3

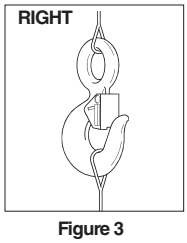


Figure 4

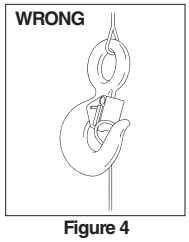
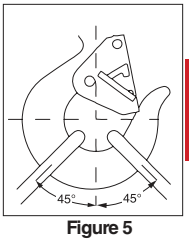


Figure 5



17

Removal of Split-Nut assembly (Reference Figure A):

- Remove vinyl cover.
- Remove spring retaining ring.
- Slide steel keeper ring off split nuts **⚠CAUTION Removal of keeper ring will allow split nut halves to fall from hook shank).**
- Remove split nut halves.

Inspection of split nut assembly and hook shank interface area (Reference Figure B):

- Inspect hook shank and split nut for signs of deformation on and adjacent to the load bearing surfaces.
- Inspect outside corner of hook shank load bearing surface to verify the corner is sharp.
- Verify retaining ring groove will allow proper seating of the retaining ring.
- Inspect retaining ring for corrosion or deformation. Remove from service any retaining ring that has excessive corrosion or is deformed.
- Use fine grit emery or crocus cloth to remove any corrosion from machined hook shank and split nut assembly.
- Follow inspection recommendations listed in this document under IMPORTANT SAFETY INFORMATION.
- If corrosion is present on the nut / shank interface area and deterioration or degradation of the metal components is evident, further inspection is required.
  - The use of a feeler gauge is required to properly measure the maximum allowable gap width between the split nut inside diameters and shank outside diameters.
  - With one split nut half seated against the hook shank, push the nut to one side and measure the maximum gaps as shown in Figure B. The hook should be measured in four places, 90-degrees apart.
  - Repeat above inspection procedure with other half of split nut.
  - Remove from service any hook and split nut assembly that exhibits a gap greater than 0.030".

Installation of split nut assembly (Reference Figure A):

- Coat hook shank and inside of split nut with an anti-seize compound or heavy grease.
- Install split nut halves onto shank. The flanged bottom of the split nut should be closest to the hook shoulder.
- Slide steel keeper ring over split nut halves. Verify the split nut halves properly seat against the load bearing surface of the hook shank and the steel keeper ring seats against the flange of the split nut.
- Install retaining ring onto split nut halves. Verify the retaining ring seats properly in the retaining ring groove on the outside diameter of the split nut assembly.
- Install vinyl cover over split nut and hook shank assembly.
- Verify all fasteners are correctly installed.
- Always use Genuine Crosby replacement parts.

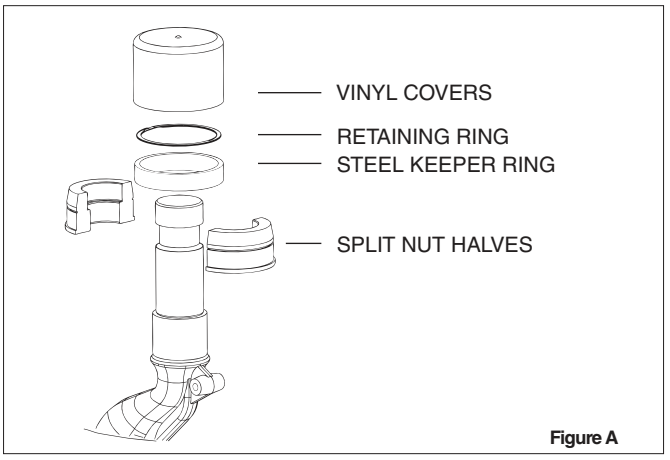


Figure A

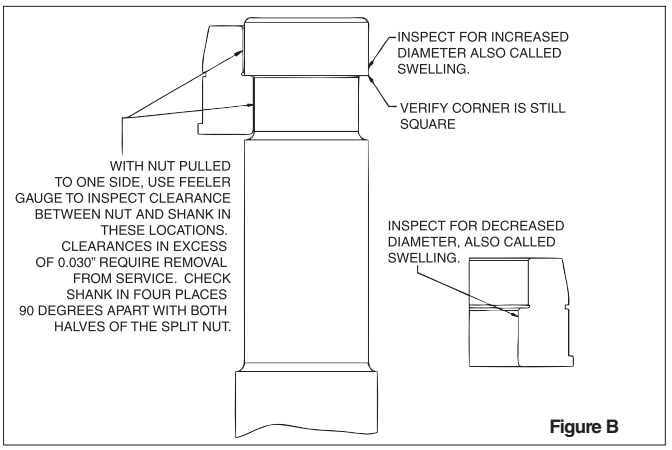
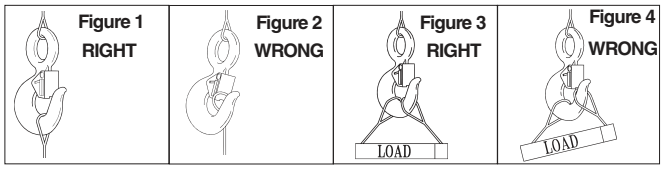


Figure B

Warning and Application Instructions For McKissick® Hook Latch Kit

IMPORTANT SAFETY INFORMATION - READ & FOLLOW

- Always inspect hook and latch before using.
- Never use a latch that is distorted or bent.
- Always make sure spring will force the latch against the tip of the hook.
- Always make sure hook supports the load. The latch must never support the load (See Figures 1 & 2).
- When placing two (2) sling legs in hooks, make sure the angle between the legs is less the 90° and if the hook or load is tilted, nothing bears against the bottom of this latch (See Figures 3 & 4).
- Latches are intended to retain loose sling or devices under slack conditions.
- Latches are not intended to be an anti-fouling device.



⚠ WARNING

- **Loads may disengage from hook if proper procedures are not followed.**
- **A falling load may cause serious injury or death.**
- **See OSHA Rule 1926.1431(g)(1)(i)(A) and 1926.1501(g)(4)(iv)(B) for personnel hoisting for cranes and derricks. Only a Crosby or McKissick hook with a PL Latch attached and secured with bolt, nut and cotter (or Crosby Toggle Pin) or a Crosby hook with a S-4320 Latch attached and secured with a cotter pin, or a Crosby SHUR-LOC® hook in the locked position may be used for any personnel hoisting. A hook with a Crosby SS-4055 latch attached shall NOT be used for personnel lifting.**
- **Hook must always support the load. The load must never be supported by the latch.**
- **Do not use this latch in applications requiring non-sparking.**
- **Read and understand these instructions before using hook and latch.**

Crosby® / BULLARD® GOLDEN GATE® HOOKS

WARNINGS & APPLICATION INSTRUCTIONS

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 tip, which allows 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 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.

IMPORTANT SAFETY INFORMATION - READ & 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 B 30.10.
- 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.)
- See WARNING box and Figure 6 for special instructions for securing the nut to the shank at assembly.
- 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 gate will not work properly on a hook with a bent or worn tip.**
- Manual - closing gates must be completely closed for the lock to work.
- 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 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. Contact Crosby Engineering to evaluate any crack.
- Never repair, alter, rework, or reshape a hook by welding, heating, burning, or bending.
- Never side load, back load, or tip load a hook. Side loading, back loading and tip loading are conditions that damage and reduce the capacity of the 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.

⚠ WARNING

- **Loads may disengage from hook if proper procedures are not followed.**
- **A falling load may cause serious injury or death.**
- **Before using, inspect the hook and gate daily to ensure it is in proper operating condition.**
- **Failure to properly insert the pin could result in the load falling.**
- **All Golden Gate® Hooks with threaded shanks require a pin to secure the nut to the shank. This pin prevents the nut from backing off or unscrewing from the threads and causing the load to drop.**
- **If the pin and nut are removed from the shank to replace any hook components, the pin and nut must be installed before use.**

  NOTE: 1. If a solid pin was used, the old pin "must"be discarded and a new pin inserted to secure the nut to the shank.

  2. If a spring pin (coil type) was used, it may be reused provided that the spring pin and / or the drill hole was not damaged.
- **The gate is not a load-bearing device. Do not allow the sling or other loads to bear against the gate.**
- **Threads may corrode and / or strip and drop the load.**
- **Hands, fingers and body should be kept away from the hook and load whenever possible.**
- **Never apply more force than the hook's assigned Working Load Limit (WLL) rating.**
- **Read and understand these instructions before using.**

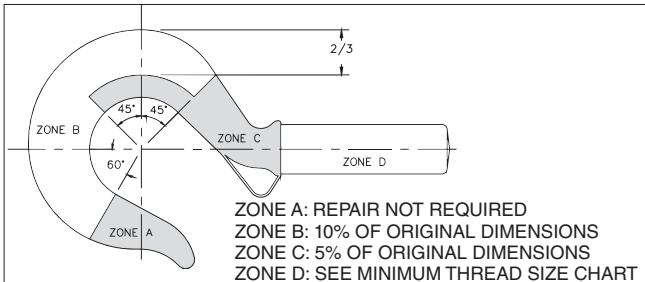


Figure 1

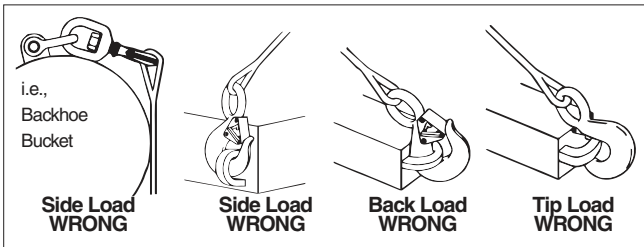
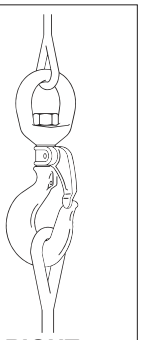


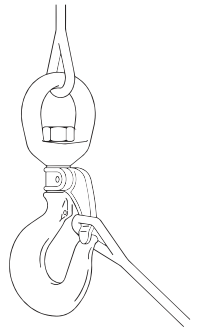
Figure 2

17

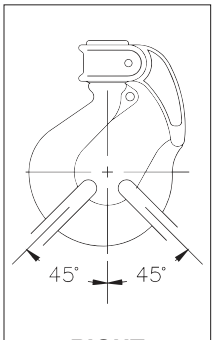
- The use of a latch may be mandatory by regulations or safety codes: e.g., OSHA, MSHA, ASME B30, Insurance etc.
- Always make sure the hook supports the load (See Figure 3). The gate must never support the load (See Figure 4).
- When multileg slings are placed in the base (bowl/saddle) of the hook, the maximum included angle between sling legs shall be 90 deg. The maximum sling leg angle with respect to the hook centerline for any rigging arrangement shall be 45 degrees. A collector ring, such as a link or shackle, should be used to maintain in-line load when more than two legs are placed in a hook or for angles greater than 45 degrees with respect to hook centerline. When more than two legs are placed in the hook bunching of the legs shall be avoided.
- See ASME B30.10 “Hooks” for additional information.
- If any of the following conditions exist, remove hook from service immediately and repair with genuine Crosby / Bullard Golden Gate® hook parts or replace the hook.
  - The gate does not lock in the closed position.
  - The gate is worn, deformed, inoperative, or fails to bridge the hook throat opening.
  - Load pins or bolts in the chain connectors are worn or bent.
- When hook is used to support a hoist, the weight of the hoist must be deducted from the assigned hook Working Load Limit.
- The rated capacity of chain connector hook assemblies must equal or exceed the capacity of the hoist.



RIGHT
Figure 3



WRONG
Figure 4



RIGHT
Figure 5

Important – Basic Machining and Thread Information – Read and Follow

- Wrong thread and/or shank size can cause stripping and loss of load.
- The maximum diameter is the largest diameter that will fit into the gate.
- All threads must be Class 2 or better.
- The minimum thread length engaged in the nut should not be less than one (1) thread diameter.
- All nuts must be secured to the shank by cross drilling the nut and threaded shank and inserting the appropriate coil type spring pin (See WARNING box and Figure 6 for special instructions).
- Coil type spring pin must be as long as the distance across the nut flats or diameter (See Figure 6).
- Consult the Crosby / Bullard Golden Gate® Hook Identification and Working Load Limit Chart (See below) for the coil type spring pin diameter.
- Remove any hook from service that requires a larger coil type spring than that shown in the chart below.
- Hook shanks are not intended to be swaged on wire rope or rod.
- Hook shanks are not intended to be drilled and internally threaded.
- Crosby cannot assume responsibility for:
  (A) the quality of machining,
  (B) the type of application, or
  (C) the means of attachment to the power source or load.

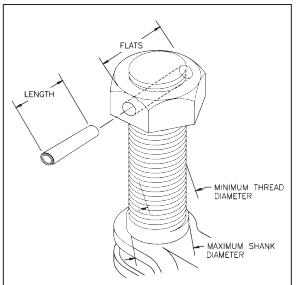


Figure 6

- Consult the Crosby/Bullard Golden Gate® Hook Identification & Working Load Limit Chart (below) for the minimum thread size for assigned Working Load Limits (WLL). +
- Remove from service any hook which has threads corroded more than 20% of the nut engaged length.

Crosby® / Bullard Golden Gate® Hook Identification and Working Load Limit Chart

Hook / Gate Size	Working Load Limit ** + (t)	Maximum Shank Diameter (mm)	Minimum Thread Size	Spring* Pin Size (mm)	Drilled Hole Size (mm)	Hook / Gate Size	Working Load Limit (t)	Maximum Shank Diameter (mm)	Minimum Thread Size	Spring* Pin Size (mm)	Drilled Hole Size (mm)
1	.45	—	—	—	—	11	8.35	38	1-1/2 - 6 UNC	7.9	7.8/8.10
2	.90	12.70	1/2 - 13 UNC	3.2	3.15/3.30	12	11.15	41.2	1-5/8 - 5-1/2 UNC	7.9	7.8/8.10
3	1.27	14.20	9/16 - 12 UNC	3.2	3.15/3.30	13	13.6	44.4	1-3/4 - 5 UNC	9.5	9.40/9.7
4	1.54	15.80	5/8 - 11 UNC	3.2	3.15/3.30	14	16.8	50.7	2 - 4-1/2 UNC	9.5	9.40/9.7
5	2.09	19.00	3/4 - 10 UNC	4.0	3.94/4.05	16	22.4	69.8	2-3/4 - 4 UNC	12.7	12.5/12.95
6	3.63	22.20	7/8 - 9 UNC	4.75	4.70/4.90	16-A	29.9	69.8	2-3/4 - 4 UNC	12.7	12.5/12.95
7	3.81	25.30	1 - 8 UNC	4.75	4.70/4.90	17	44.9	101.5	4 - 4 UNC	19.1	18.9/19.30
8	5.00	28.50	1-1/8 - 7 UNC	6.35	6.25/6.50	17-A	59.9	101.5	4 - 4 UNC	19.1	18.9/19.30
9	6.53	31.70	1-1/4 - 7 UNC	6.35	6.25/6.50	—	—	—	—	—	—

* Heavy Duty Coil Type Spring Pin.

** Minimum ultimate strength is 4 times the Working Load Limit.

+ Working Load Limit - The maximum mass or force which the product is authorized to support in general service when the pull is applied in-line, unless noted otherwise with respect to centerline of the product. This term is used interchangeably with the following terms: 1. WLL, 2. Rated Load Value, 3. SWL, 4. Safe Working Load, 5. Resultant Safe Working Load. Ultimate Load is 4 times the Working Load.

S-4320 HOOK LATCH KIT

WARNINGS & APPLICATION INSTRUCTIONS

(For Crosby 319N, 320N, and 322N, S-1327, and A-1339 Hooks)

Important Safety Information - Read & Follow

- Always inspect hook and latch before using.
- Never use a latch that is distorted or bent.
- Always make sure spring will force the latch against the tip of the hook.
- Always make sure hook supports the load. The latch must never support the load (See Figures 1 & 2).
- When placing two (2) sling legs in hook, make sure the angle between the legs is less than 90° and if the hook or load is tilted, nothing bears against the bottom of this latch (See Figures 3 & 4).
- Latches are intended to retain loose sling or devices under slack conditions.
- Latches are not intended to be an anti-fouling device.
- When using latch for personnel lifting, select proper cotter pin (See Figure 5). See Step 7 below for proper installation instructions.
  - Never reuse a bent cotter pin.
  - Never use a cotter pin with a smaller diameter or different length than recommended in Figure 5.
  - Never use a nail, a welding rod, wire, etc., in place of recommended cotter pin.
  - Always ensure cotter pin is bent so as not to interfere with sling operation.
  - Periodically inspect cotter pin for corrosion and general adequacy.

⚠ WARNING

- **Loads may disengage from hook if proper procedures are not followed.**
- **A falling load may cause serious injury or death.**
- **Hook must always support the load. The load must never be supported by the latch.**
- **See OSHA Rule 1926.1431(g)(1)(i)(A) and 1926.1501(g)(4)(iv)(B) for Personnel Hoisting by Crane or Derricks. A Crosby S-319N, S-320N, S-322N, S-1327, and A-1339 Hook with an S-4320 latch attached (when secured with cotter pin) may be used for lifting personnel.**
- **An S-4320 Latch is only to be used with a Crosby S-319N, S-320N, S-322N, S-1327, and A-1339 Hook.**
- **DO NOT use this latch in applications requiring non-sparking.**
- **Read and understand these instructions before using hook and latch.**

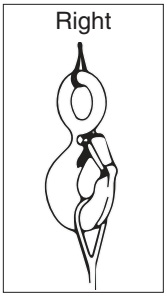


Figure 1

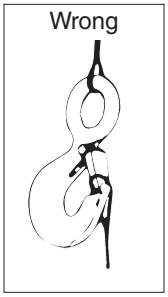


Figure 2

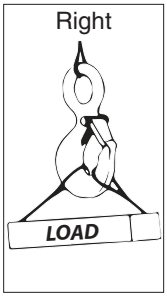


Figure 3

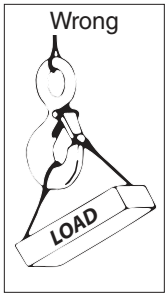
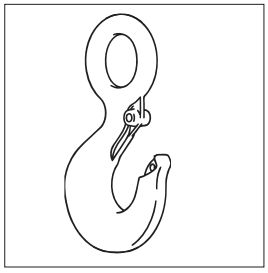


Figure 4

Hook Identification Code	Recommended Cotter Pin Dimensions (mm)	
	Diameter	Length
D	3.19	19.1
F	3.19	19.1
G	3.19	25.4
H	4.76	31.8
I	6.35	38.1
J	23.8	50.8
K	23.8	50.8
L	9.53	76.2
N	9.53	76.2

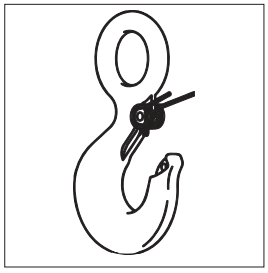
† The current SS-4055 latch kit and the PL latch will not fit new 319N, 320N, or 322N hooks. They will continue to be offered in both styles to service existing hooks. Important – The new S4320 latch kit will not fit the old 319, 320, or 322 hooks.

IMPORTANT – Instructions for Assembling S-4320 Latch on Crosby 320N Hooks



Step 1

1. Place hook at approximately a 45 degree angle with the cam up.

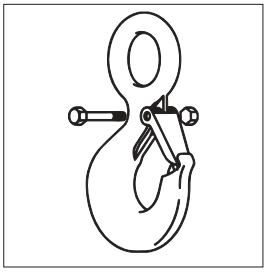


Step 2

2. Position coils of spring over cam with legs of spring pointing toward point of hook and loop of spring positioned down and lying against the hook.

Step 3

3. Position latch to side of hook points. Slide latch onto spring legs between lockplate and latch body until latch is partially over hook cam. Then depress latch and spring until latch clears point of hook.

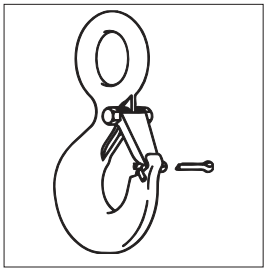


Steps 4, 5, & 6

4. Line up holes in latch with hook cam.

5. Insert bolt through latch, spring, and cam.

6. Tighten self-locking nut on one end of bolt.



Step 7 – For Personnel Lifting

7. With latch in closed position and rigging resting in bowl of hook, insert cotter pin through hook tip and secure by bending prongs.

Crosby® HOOK LATCH KIT

WARNINGS & APPLICATION INSTRUCTIONS

SS-4055
(Stainless Steel)

IMPORTANT SAFETY INFORMATION - READ & FOLLOW

- Always inspect hook and latch before using.
- Never use a latch that is distorted or bent.
- Always make sure spring will force the latch against the tip of the hook.
- Always make sure hook supports the load. The latch must never support the load (See Figures 1 & 2).
- When placing two (2) sling legs in hook, make sure the angle between legs is small enough and the legs are not tilted so that nothing bears against the bottom of the latch (See Figures 3 & 4).
- Latches are intended to retain loose sling or devices under slack conditions.
- Latches are not intended to be an anti-fouling device.

⚠ WARNING

- **Loads may disengage from hook if proper procedures are not followed.**
- **A falling load may cause serious injury or death.**
- **See OSHA Rule 1926.1431(g)(1)(i)(A) and 1962.1501(g)(4)(iv)(B) A hook and this style latch must not be used for lifting personnel.**
- **Hook must always support the load. The load must never be supported by the latch.**
- **Read and understand these instructions before using hook and latch.**

RIGHT

Figure 1

WRONG

Figure 2

RIGHT

Figure 3

WRONG

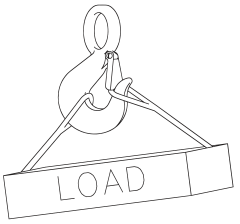
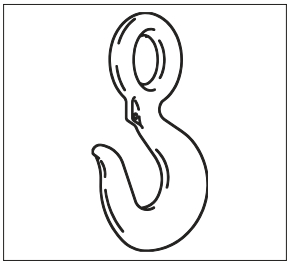


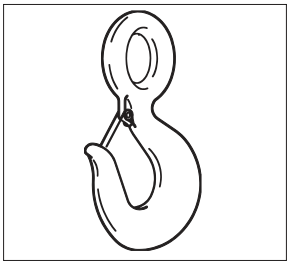
Figure 4

IMPORTANT – Instructions for Assembling Model SS-4055 Latch on Crosby Hooks



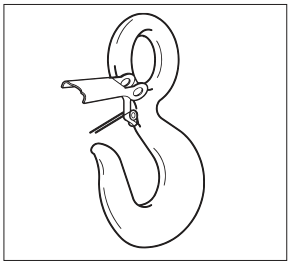
Step 1

1. Place hook at approximately a 45 degree angle with the cam up.



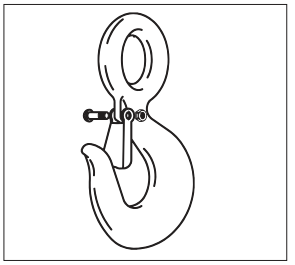
Step 2

2. Position coils of spring over cam with tines of spring pointing toward point of hook and loop of spring positioned down and lying against the hook.



Step 3

3. Position latch over tines of spring with ears partially over hook cam. Swing latch to one side of hook, point and depress latch and spring until latch clears point of hook.



Steps 4, 5, & 6

4. Line up holes in latch with hook cam.

5. Insert bolt through latch, spring, and cam.

6. Tighten self-locking nut on one end of bolt.

This application/warning information apply to Crosby products only.

Crosby® MODEL PL HOOK LATCH KIT

WARNINGS & APPLICATION INSTRUCTIONS

Model PL

IMPORTANT SAFETY INFORMATION - READ & FOLLOW

(Pat. USA & Canada)

- Always inspect hook and latch before using.
- Never use a latch that is distorted or bent.
- Always make sure spring will force the latch against the tip of the hook.
- Always make sure hook supports the load. The latch must never support the load (See Figures 1 & 2).
- When placing two (2) sling legs in hook, make sure the angle between the legs is less than 90° and if the hook or load is tilted, nothing bears against the bottom of this latch (See Figures 3 & 4).
- Latches are intended to retain loose sling or devices under slack conditions.
- Latches are not intended to be an anti-fouling device.

⚠ WARNING

- **Loads may disengage from hook if proper procedures are not followed.**
- **A falling load may cause serious injury or death.**
- **See OSHA Rule 1926.1431(g)(1)(i)(A) and 1926.1501(g)(4)(iv)(B) for Personnel Hoisting by Cranes or Derricks. A Crosby or McKissick Hook with a positive Locked PL or S-4320 Latch may be used to Lift Personnel.**
- **Hook must always support the load. The load must never be supported by the latch.**
- **DO NOT use this latch in applications requiring non-sparking.**
- **Read and understand these instructions before using hook and latch.**

Right

Figure 1

Wrong

Figure 2

Right

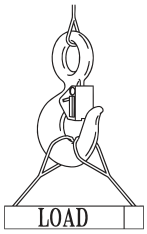


Figure 3

Wrong

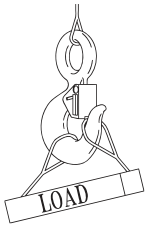
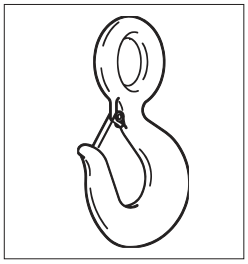


Figure 4

IMPORTANT - Instructions for Assembling Model PL Latch on Crosby or McKissick Hooks

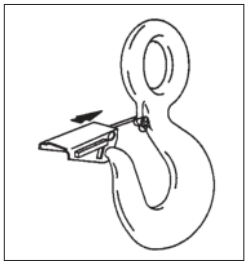
Step 1

1. Place hook at approximately a 45 degree angle with the cam up.



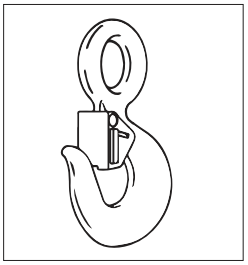
Step 2

2. Position coils of spring over cam with legs of spring pointing toward point of hook and loop of spring positioned down and lying against the hook.



Step 3

3. Position latch to side of hook points. Slide latch onto spring legs between lockplate and latch body until latch is partially over hook cam. Then depress latch and spring until latch clears point of hook.

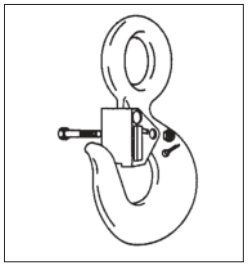


Steps 4, 5, & 6

4. Line up holes in latch with hook cam.

5. Insert bolt through latch, spring, and cam.

6. Tighten self-locking nut on one end of bolt.



Step 7 — For Personnel Lifting

7. With latch in closed position and rigging resting in bowl of hook, insert bolt through latch and secure with nut and cotter pin. When bolt, nut and cotter pin are not being used, store them in a designated place upon the personnel platform.

Crosby® MODEL PL-N/O HOOK LATCH KIT

WARNINGS & APPLICATION INSTRUCTIONS

Model PL-N/O

IMPORTANT SAFETY INFORMATION - READ & FOLLOW

- Always inspect hook and latch before using.
- Never use a latch that is distorted or bent.
- Always make sure spring will force the latch against the tip of the hook.
- Always make sure hook supports the load. The latch must never support the load (See Figures 1 & 2).
- When placing two (2) sling legs in hook, make sure the angle between the legs is less than 90° and if the hook or load is tilted, nothing bears against the bottom of this latch (See Figures 3 & 4).
- Latches are intended to retain loose sling or devices under slack conditions.
- Latches are not intended to be an anti-fouling device.

⚠ WARNING

- **Loads may disengage from hook if proper procedures are not followed.**
- **A falling load may cause serious injury or death.**
- **See OSHA Rule 1926.1431(g)(1)(i)(A) and 1926.1501(g)(4)(iv)(B) for Personnel Hoisting by Crane or Derricks. A Crosby or McKissick Hook with a Positive Locked PL-N/O or S-4320 Latch may be used to lift personnel.**
- **Hook must always support the load. The load must never be supported by the latch.**
- **DO NOT use this latch in applications requiring non-sparking.**
- **Read and understand these instructions before using hook and latch.**

RIGHT

Figure 1

WRONG

Figure 2

RIGHT

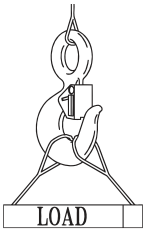


Figure 3

WRONG

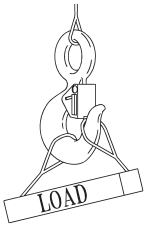
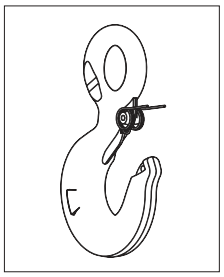


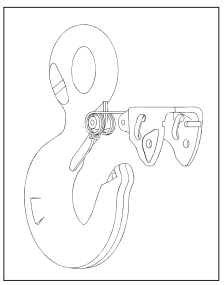
Figure 4

IMPORTANT - Instructions for Assembling Model PL-N/O Latch on Crosby or McKissick Hooks



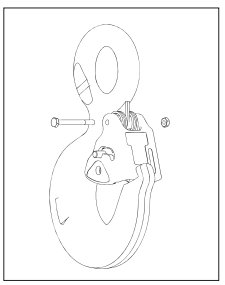
Step 1

1. Place hook in upright position. Position coils of spring over cam with legs of spring pointing toward tip of hook, and loop of spring positioned down and lying against the hook.



Step 2

2. Slip the latch over the spring until the two spring legs are positioned into the grooves located on the inside of the latch housing (legs of spring should fit between the gate and the housing).



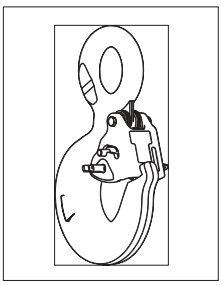
Step 3 4, 5, & 6

3. Slide latch housing up the spring legs until latch clears hook tip.

4. Resting latch on interlocking hook tip, line up holes in latch with hook cam.

5. Insert bolt through latch spring & cam.

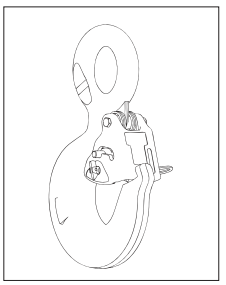
6. Tighten self-locking nut on one end of bolt.



Step 7,8 - For Personnel Lifting

7. Rigging should be resting in bowl of hook, with latch in closed position and gate locked.

8. Insert toggle lock pin through hole and depress spring until toggle clears hole on other side of latch.



Step 9 - For Personnel Lifting

9. Rotate toggle 90 degrees to secure pin (ensure toggle is in closed position as shown).

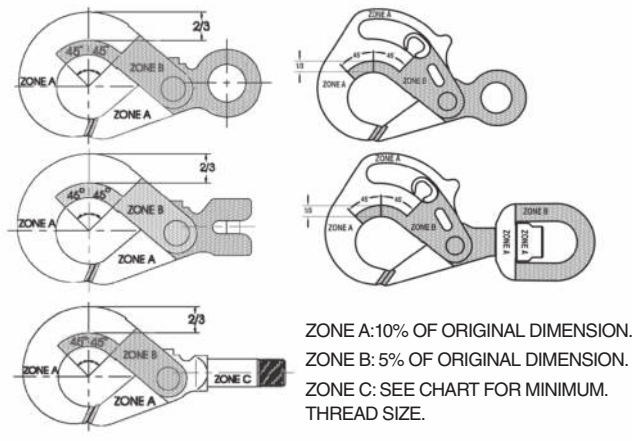
Crosby® SHUR-LOC® HOOKS

WARNING & APPLICATION INSTRUCTIONS

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 ASME B30.10.
- For hooks used in frequent load cycles, pulsating loads, or severe duty as defined by ASME B30.10, 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 5%, not to exceed 1/4",(6mm) or shows any visible apparent bend or twist from the plane of the unbent hook, 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 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. Contact Crosby Engineering to evaluate any crack.
- Never repair, alter, rework, or reshape a hook by welding, heating, burning, or bending.
- Never side load, back load or tip load a hook. Side loading, back loading and tip loading are conditions that damage and reduce the capacity of the hook (See Figure 2).
- S-1326A can be used for limited rotations under load (infrequent, noncontinuous).
- Efficiency of synthetic sling material may be reduced when used in eye or bowl of hook.
- Always make sure the hook supports the load (See Figure 3). Do not use hook tip for lifting (See Figure 4).

- **Loads may disengage from hook if proper procedures are not followed.**
- **A falling load may cause serious injury or death.**
- **Positive locking latch will unlock when trigger is depressed. Never use hook unless hook and latch are fully closed and locked.**
- **Keep body parts clear of pinch point between hook tip and hook latch when closing.**
- **Keep hand(s) from between throat of hook and sling or other device.**
- **Do not use hook tip for lifting.**
- **Do not use hook handle for lifiting.**
- **Do not rig the finger pull open, place objects in the finger pull area, or in any way inhibit complete and full operation of the finger pull mechanism.**
- **Shank threads may corrode and/or strip and drop the load.**
- **Remove securement nut to inspect threads for corrosion or to replace S-1326A bearing washers (2) and or S-13326 thrust bearing.**
- **Never apply more force than the hook's assigned Working Load Limit (WLL) rating.**
- **See OSHA Rule 1926.1431(g) and 1926.1501(g) for personnel hoisting by cranes or derricks. A Crosby 1318A, 1326A, 13326, 1316A, or 1317A hook may be used for lifting personnel.**
- **Use only genuine Crosby parts as replacements.**
- **Read and understand these instructions before using hook.**



ZONE A:10% OF ORIGINAL DIMENSION.
ZONE B: 5% OF ORIGINAL DIMENSION.
ZONE C: SEE CHART FOR MINIMUM. THREAD SIZE.

FIGURE 1

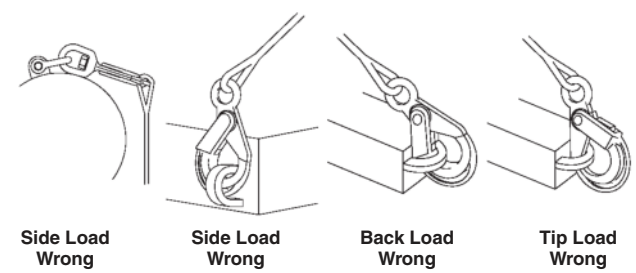
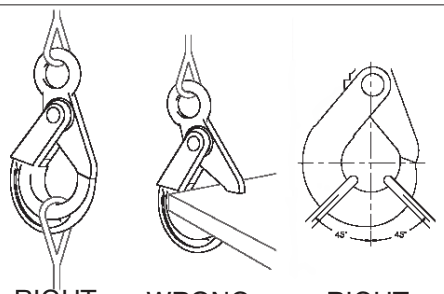


FIGURE 2

17

- When placing two (2) sling legs in hook, make sure the angle from vertical to the leg nearest the hook tip is not greater than 45 degrees, and the included angle between the legs does not exceed 90 degrees* (See Figure 5).
- See ASME B30.10 “Hooks” for additional information.

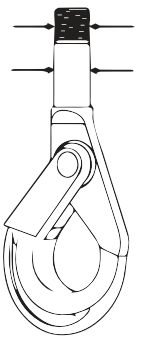
*For two legged slings with angles greater than 90°, use an intermediate link such as a master link or bolt type shackle to collect the legs of the slings. The intermediate link can then be placed over the hook to provide an in-line load on the hook. This approach must also be used when using slings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



RIGHT **FIGURE 3** WRONG **FIGURE 4** RIGHT **FIGURE 5**

Important Basic Machining and Thread Information: Read and Follow

- Wrong thread and/or shank size can cause stripping and loss of load.
- The maximum diameter is the largest diameter, after cleanup, that could be expected after allowing for straightness, pits, etc.
- All threads must be Class 2 or better.
- The minimum thread length engaged in the nut should not be less than one (1) thread diameter.
- Hook shanks are not intended to be swaged on wire rope or rod.
- Hook shanks are not intended to be drilled (length of shank) and internally threaded.
- Crosby cannot assume responsibility for, (A) the quality of machining, (B) the type of application, or (C) the means of attachment to the power source or load.
- Consult the Crosby Hook Identification & Working Load Limit Chart (See below) for the minimum thread size for assigned Working Load Limits (WLL).†
- Remove from service any Hook which has threads corroded more than 20% of the nut engaged length.



Minimum Thread Size

Maximum Shank Diameter

Crosby® Hook Identification & Working Load Limit Chart †

S-1316A & S-1317A Only Grade 100 Chain			S-1318A, S-1326A, S-13326						S-1318A Only		
Chain Size		Working Load Limit (t)** 4:1	Grade 100 Chain			Wire Rope XXIP Mechanical Splice			Maximum Shank Diameter		Minimum Thread Size (in)
			Chain Size		Working Load Limit (t)** 4:1	Wire Rope Size (mm)		Working Load Limit (t)* 5:1			
(mm)	(in)		(mm)	(in)		(mm)	(in)		(mm)	(in)	
6	—	1.45	6	—	1.45	8	5/16	1.00	18	.72	5/8 - 11 UNC
7	1/4	1.95	7 - 8	1/4	1.95	11	3/8	1.91	24	.94	5/8 - 11 UNC
8	5/16	2.60	8	5/16	2.59	11	1/2	1.91	24	.94	3/4 - 10 UNC
10	3/8	4.00	10	3/8	3.99	13	5/8	3.90	27	1.06	3/4 - 10 UNC
13	1/2	6.80	13	1/2	7	16	3/4	5.62	30	1.19	1-1/8 - 7 UNC
16	5/8	10.3	16	5/8	10	22	7/8	7.53	35	1.38	1-3/8 - 6 UNC
18/20	3/4	16.0	18-20	3/4	16	26	1	9.98	—	—	—
22	7/8	19.4	22	7/8	19	29	1-1/8	12.02	—	—	—
26	1	27.1	26	1	27	32	1-1/4	14.74	—	—	—

* Ultimate Load is 5 times the Working Load Limit based on XXIP Wire Rope.

** Ultimate Load is 4 times the Working Load Limit based on Grade 100 Chain.

† Working Load Limit - The maximum mass of force which the product is authorized to support in general service when the pull is applied in-line, unless noted otherwise, with respect to the centerline of the product. This term is used interchangeably with the following terms: 1. WLL, 2. Rated Load Value, 3. SWL, 4. Safe Working Load, 5. Resultant Safe Working Load. † † Based on minimum thread size for assigned WLL.

Technical Information

The following information aims to give advice and explain the most common questions in order to ensure safe and proper use of lifting equipment.

It is of the utmost importance that this information is known to the user, and in accordance with the Machinery Directive 2006/42/EC this information must be delivered to the customer.

See website or user instructions for assembly instructions.

Meets listed current specifications and standards at time of publication of this catalog.

All G80 and G100 Alloy Chains, and Alloy components meet or exceed the safety standards as prescribed by ASME B30.9 and OSHA 1910-184 for slings. Always comply with applicable International, National, Federal and local regulations as they govern worksite activity. Understand all governing laws and safety standards before any products are used. Contact your International, National, Federal and local standards and regulations organizations for reference assistance.

Extreme Environments

The in-service temperature affects the WLL as follows:

Temperature (°C)	Reduction of WLL			
	Gunnebo Grade 10 (400) chain	Crosby Grade 10 & Gunnebo Grade 10 (200) chain	Crosby & Gunnebo Grade 10 components	Crosby & Gunnebo Grade 8 chain & components
-40 to +200 °C	0 %	0 %	0 %	0 %
+200 to +300 °C	10 %	Not allowed	10 %	10 %
+300 to +400 °C	25 %	Not allowed	25 %	25 %

Upon return to normal temperature, the sling reverts to its full capacity within the above temperature range. Chain slings should not be used above or below these temperatures. Note: A chain sling with Grade 10 (100) chain must not be used in temperatures above 200°C.

- Chain and components must not be used in alkaline (>pH10) or acidic conditions (<pH6).
- Comprehensive and regular examination must be carried out when used in severe or corrosive inducing environments.
- In uncertain situations consult your Gunnebo Industries dealer.

Surface Treatment

Note: Hot-dip galvanizing or plating is not allowed outside the control of the manufacturer.

Protect Yourself and Others

- Before each use the chain sling should be checked for obvious damage or deterioration.
- Know the weight of the load, the center of gravity and ensure it is ready to move and no obstacles will obstruct the lift.
- Check the conformity of the load with the WLL of the ID tag for the specific working configuration. Never use a sling without a legible valid ID tag!
- Prepare the landing site.
- Never overload a sling and avoid shock loading.
- Never use an improper sling configuration.
- Never use a worn out or damaged sling.
- Never ride on the load.
- Never walk or stand under a suspended load.
- Take into consideration that the load may swing or rotate.
- Watch your feet and fingers while loading/unloading.
- Always ensure that your back is clear.

General Advice

- Ensure that the sling is precisely as ordered.
- Ensure that the manufacturers certificate is in order.
- A metal I.D. Tag must always be attached to a chain sling, showing serial number, size, reach, rated capacity at angle of lift and manufacturer.
- Ensure that all details of the chain sling are recorded.
- Ensure that the staff using the chain sling has received the appropriate information and training.

Asymmetrical Loading Conditions

For unequally loaded chain legs we recommend that the WLL are determined as follows:

- 2-leg slings calculated as the corresponding 1-leg sling
- 3 and 4-leg slings calculated as the corresponding 1-leg sling. (If it is certain that 2-legs are equally carrying the major part of the load, it can be calculated as the corresponding 2-leg sling.)

Correct Use

Machining and threading specifications for BKT shank hook

- BKT self-locking hook shank machining limits are defined and are given in TABLE 2 and these limits are required for WLL's given. Failure to comply can result in stripped threads and loss of load. Hook shank threads shall end with a thread relief. Hook shank shall not be swaged to wire rope or rod. Hook shank shall not be drilled and internally threaded.
- Gunnebo Industries cannot assume responsibility for:

  1. Machining quality,
  2. Application,
  3. Attachment to power source or load

Table 2a

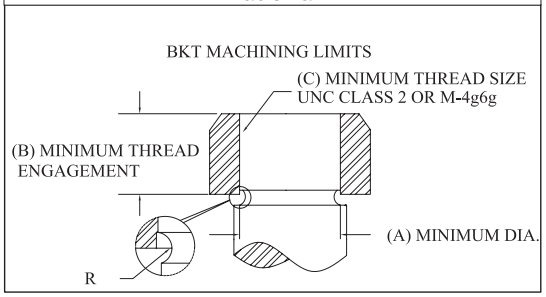
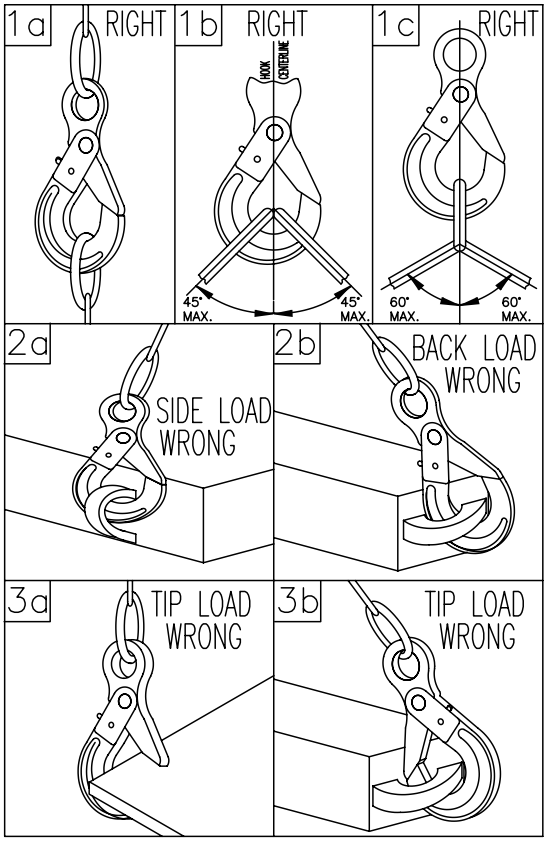


Table 2b				
English				
Trade Size		(A)	(B)	(C) Min. Thread
MM	IN	Dia.	Len.	Class 2
5/6	7/32	11	14	9/16-12 UNC
7/8	9/32	12	16	5/8-11 UNC
10	3/8	15	19	3/4-10 UNC
13	1/2	21	25	1-8 UNC
16	5/8	25	32	1-1/4-7 UNC

Table 2c				
Metric				
Table Size		(A)	(B)	(C) Min. Thread
MM	IN	Dia.	Len.	Class 4g6g
5/6	7/32	11	14	M14x2
7/8	9/32	13	16	M16x2
10	3/8	16	20	M20x2.5
13	1/2	20	24	M24x3
16	5/8	25	30	M30x3.5

Safe use of self-locking hook

- Alloy steel BK self-locking hooks may be used to rig personnel platforms when lift system is in full compliance with OSHA 1926.1501(g) and passing the applicable inspection criteria.
- Loads shall be centered in the base (bowl/ saddle) of hook to prevent point loading of the hook (See Figure 1a, 1b & 1c).
- Hooks shall not be used in such a manner as to place a side load or back load on the hook (See Figure 2a & 2b).
- When using a device to close the throat opening of the hook, care shall be taken that the load is not carried by the closing device (See Figure 3a & 3b).
- Hands, fingers and body shall be kept from between hook and load.
- The use of a hook with a latch does not preclude the inadvertent detachment of a slack sling or a load from the hook. Visual verification of proper hook engagement is required in all cases.
- Self-locking hooks shall be locked during use.
- When a hook is equipped with a latch, the latch should not be restrained from closing during use.
- Self-locking hooks shall not be rigged with more than two (2) sling legs in the hook saddle and sling leg angles shall not be greater than 45° from hook centerline (Figure 1b).
- Self-locking hooks shall be rigged with a master ring or shackle when three (3) or more sling legs are used or sling leg angles exceed 45° from hook centerline (Figure 1c).



Correct Use

A chain sling is usually attached to the load and the crane by means of terminal fittings such as hooks, links etc.

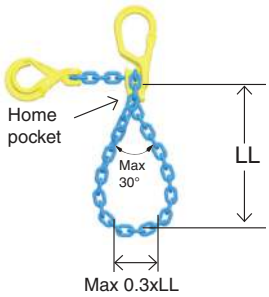
When frequently using a sling to it's maximum load, we recommend increasing the sling size by one dimension.

Chain should be without twists or knots, if the chain leg needs length adjustment use a shortening device. The lifting point should be seated well down in the terminal fitting, never on the point or wedged in the opening. The terminal fitting should be free to incline in any direction.

The chain may be passed under or through the load to form a choke hitch or basket hitch. The chain should be allowed to assume it's natural angle and should not be hammered down.

Where choke hitch is employed the WLL of the chain sling shall be reduced by 20%.

Endless chain slings shall be rated in the same way as a 2-legged sling.

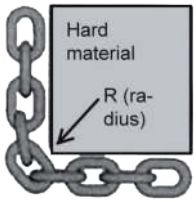


Home pocket loop shall have an internal loop top angle of max. 30°. Rule of thumb: Cross dimension of the load shall be max. 0.3 times the loop length (LL)

Definition: The home pocket is the shortening pocket of the top component directly above the clevis to which the chain is connected.

Sharp edges

Use edge protectors to prevent sharp edges from damaging the chain. If lifting over sharp edges reduce the working load with the following reduction tor.



Edge load	R >2 x chain Ø	R > chain Ø	R < chain Ø
Reduction factor	1.0	0.7	0.5

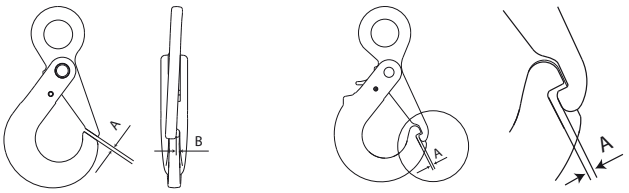
- The angle of the edge must not be below 90°.
- Chain links shall be protected from being bent or deformed and from receiving cuts or gouges.
- Chain sling WLL is to be reduced when chain is rigged over an edge radius R less than two (2) x chain diameter (d).
- Reduced WLL equals chain sling WLL from identification tag x reduction factor.
- Slings shall be padded or protected from the edges of their loads when the edge radius is less than 0.5 of the chain diameter(d).
- Slings shall be rigged to prevent chain from sliding over a load edge radius while lifting.
- Slings used in basket hitch shall have the loads balanced to prevent slipping.

When lifting with chain directly on lugs the lug diameter > 3x the pitch of the chain, otherwise the WLL must be reduced by 50%.

Maintenance

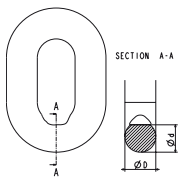
Periodic thorough examination must be carried out at least every 12 months or more frequently according to local statutory regulations, type of use and past experience.

1. Overloaded chain slings must be taken out of service.
2. If the lifting equipment is more than 25 years old, it must be recorded in the inspection register. An investigation into both its previous operating history and its current use should be made, as there is a potentially significant risk of fatigue, environmental impact etc.
3. Chain and components including load pins which have been damaged, deformed, elongated, bent or showing signs of cracks or gouges shall be replaced. Carefully grind away small sharp cuts and burrs. Additional testing by magnetic particle inspection and/or proof loading at max. 2 x WLL may be carried out.
4. The maximum permissible increase in hook aperture must not exceed 10% of the products nominal dimension.
5. Check the function of latches, triggers and retaining pins / bushes, replace when necessary. Always use Gunnebo Industries original spare parts.
6. Max. clearance between hook and latch. Note: For a Griplatch hook measure the difference between dimension A with unloaded spring and dimension A when the latch is pressed against the hook. Clearance B not applicable.



Trade size		Max. clearance (A)				Max. clearance (B)	
		Material handling		Personnel handling		(NA for griplatch hooks)	
mm	inch	mm	inch	mm	inch	mm	inch
6	7/32	2.2	0.09	1.5	0.06	3.5	0.14
7/8	9/32	2.7	0.11	1.9	0.07	4.5	0.18
7	9/32	2.7	0.11	1.9	0.07	4.5	0.18
8	5/16	2.7	0.11	1.9	0.07	4.5	0.18
10	3/8	3.0	0.12	2.1	0.08	6.0	0.24
13	1/2	3.3	0.13	2.3	0.09	7.0	0.28
16	5/8	4.0	0.16	2.8	0.11	9.0	0.35
18/20	3/4	5.5	0.22	3.9	0.15	10.0	0.39
22	7/8	6.0	0.24	4.2	0.17	11.0	0.43
26	1	6.5	0.26	4.6	0.18	12.0	0.47
32	1 1/4	7.0	0.28	4.9	0.19	13.0	0.51

7. The wear of the chain and component shall in no place exceed 10% of the products nominal dimension. The chain link wear is defined and measured as the reduction of the mean diameter measured in two perpendicular directions, see picture.



$$\frac{d_1 + d_2}{2} > 0.9d_{nn}$$

d_n = nominal diameter

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Quality assurance

Type testing

In order to prove the design, material, heat treatment and method of manufacture, each size of component and chain has been type tested in the finished condition in order to demonstrate that the component and chain possesses the required mechanical properties. The following testing procedures are particularly relevant:

Test for deformation

The Manufacturing Proof Force (MPF) for the relevant size of the component is applied and removed. The dimensions after proof loading shall not alter from the original dimensions within the tolerances prescribed in our specifications and in the international standards.

Static tensile test

The Breaking Force (BF) for each component and size is verified. The verified value shall be at least equal to the Minimum Breaking Force (MBF) value. The MBF value is equal to the Working Load Limit (WLL) multiplied by the safety factor.

Fatigue test

By fatigue testing in pulsator testing machines the toughest conditions of service are simulated.

Manufacturing testing

During manufacture continuous process tests are carried out according to the requirements in our specifications and in the latest international standards. The following testing procedures are particularly relevant:

Non destructive test

3% of every production batch of forged components are subject to magnetic particle or dye penetrating examination.

Proof force / visual inspection

Each individual component and chain link is tested to the Manufacturing Proof Force (MPF) level before delivery. The MPF level is 2.5 times the WLL, equal to 62.5% of the Minimum Breaking Force. Visual inspection is carried out on each chain link and each forged component to detect defects.

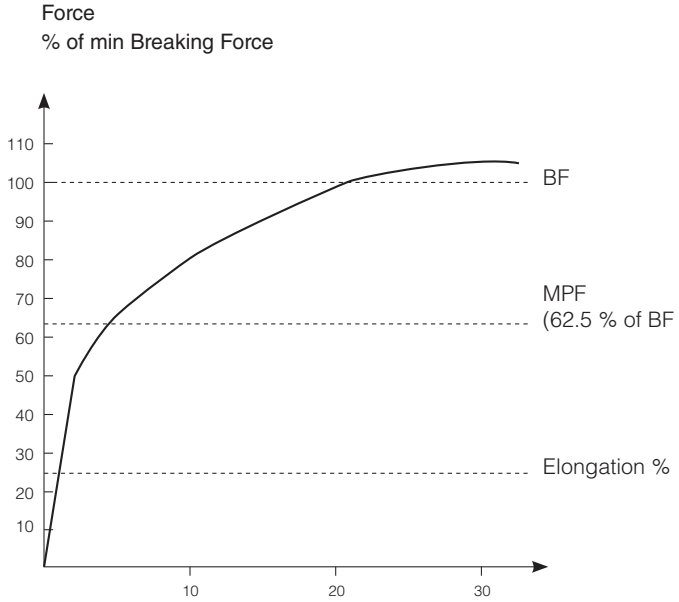
Static tensile and ultimate elongation test

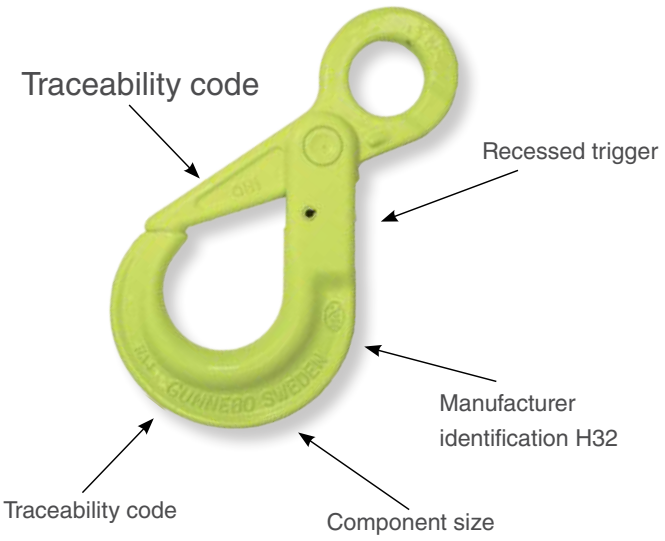
During chain manufacture, samples are tested and the Minimum Breaking Force (MBF) value and the total ultimate elongation are verified.

Bending deflection

During manufacturing, of chain and master links, samples are taken and the minimum bend deflection is verified.

Stress / elongation diagram





Crosby® S-4338 Pin Latch

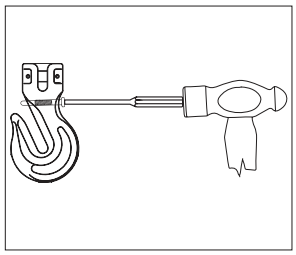
WARNING & APPLICATION INSTRUCTIONS

S-4338 Pin Latch

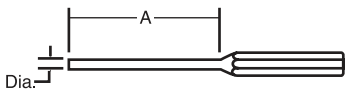
Important Safety Information Read and Follow

- Always inspect hook and pin latch before using.
- Never use a pin latch that is distorted or bent.
- Always make sure internal spring will force the pin latch forward closing throat opening of grab hook (See Figure 1).
- When a Pin Latch is provided, it is designed to retain loose chain under slack condition.
- Always make sure hook supports the load. The pin latch must never support the load (See Figure 1, 2, 3 and 4).
- Pin latch is not intended to be an anti-fouling device.
- Recommended for use with Crosby L-1338 or L-1358 Grab Hooks.

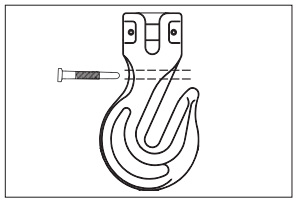
Important – Instructions for Assembling



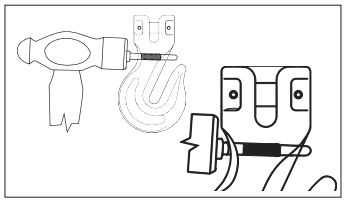
Step 1: Using a hammer and the correct roll-pin punch per chart on the right, drive the old latch pin assembly out of hook.



Hook Size (in)	Hook Size (mm)	Punch Dia. (mm)	A (mm)
1/4	7	5	75
5/16	8	5	75
3/8	10	5	75
1/2	13	8	100
5/8	16	10	100



Step 2: Insert new S-4338 pin assembly into hook.



Step 3: Using hammer, tap lightly on latch pin head until guide bushing shoulder touches hook.

⚠WARNING

- **Loads may disengage from hook if proper procedures are not followed.**
- **A falling load may cause serious injury or death.**
- **Hook must always support the load. The load must never be supported by the pin latch.**
- **See OSHA Rule 1926.1431(g)(1)(i)(A) and 1926.1501(g)(4)(iv)(B). A hook and this style latch must not be used for lifting personnel.**
- **Read and understand these instructions before using hook and pin latch.**

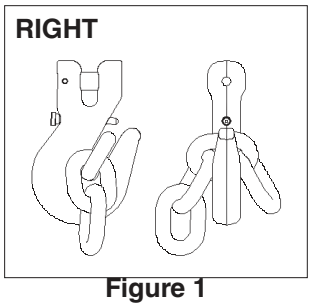


Figure 1

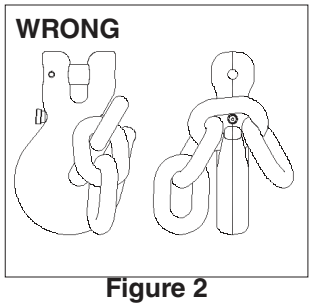


Figure 2

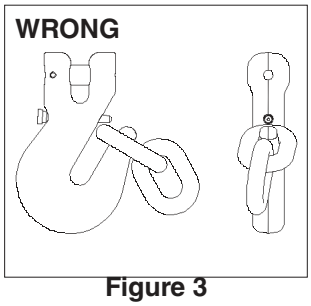


Figure 3

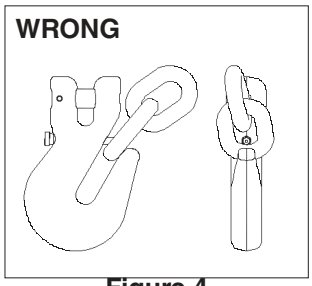


Figure 4

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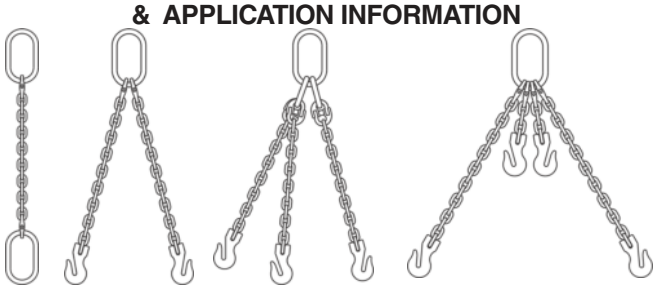
ALLOY STEEL CHAIN SLINGS AND CROSBY ELIMINATOR®

WARNING SELECTION, USE & APPLICATION INFORMATION



- **Loads may disengage from sling if proper rigging procedures and inspection are not followed.**
- **A falling load may cause serious injury or death.**
- **Inspect sling for damage before each use.**
- **Do not attempt to use sling above rated load and angle upon which it is based.**
- **Consult sling load chart for capacity reduction due to sling angle or type of hitch used.**
- **Read and understand these instructions before using sling.**

IMPORTANT SAFETY INFORMATION

Read and Follow

These warnings and instructions are applicable to alloy chain slings produced from Crosby Grade 8 (80) and Grade 10 (100) chain and components.

- Only alloy chain, grade 80 (Crosby Spectrum 8®), or grade 100 (Crosby Spectrum 10®), should be used for overhead lifting applications.
- Working Load Limit (WLL) is the maximum load in pounds which should ever be applied to chain, when the chain is new or in "as new" condition, and when the load is uniformly applied in direct tension to a straight length of chain.
- Working Load Limit (WLL) is the maximum working load for a specific minimum sling angle, measured from the horizontal plane. The minimum sling angle and Working Load Limit is identified on the sling.
- The Working Load Limit or Design factor may be affected by wear, misuse, overloading, corrosion, deformation, intentional alterations, sharp corner cutting action diameter of curvature over which the sling is used (D/d) and other use conditions.
- Shock loading and extraordinary conditions must be taken into account when selecting alloy chain slings.
- See OSHA Regulation for Slings 1910.184, ASME B30.9-"SLINGS", ASME B30.10-"HOOKS", and ASME B30.26 "RIGGING HARDWARE" for additional information.

ASME B30.9 requires a designated person inspect each new sling and attachments prior to initial use, as well as the user or other designated person perform a visual inspection on a sling each day it is used. In addition, a periodic inspection shall be performed by a designated person at least annually, and shall maintain a record of the last inspection. For further inspection information, see Chain Inspection section of this document, or refer to ASME B30.9-1.9.

CAUSE FOR REMOVAL FROM SERVICE

A sling shall be removed from service if any of the following are visible on chain or attachments:

- Wear, nicks, cracks, breaks, gouges, stretch, bend, weld splatter, discoloration from excessive temperature, or throat openings of hooks.
- Chain links and attachments that do not hinge freely to adjacent links.
- Latches on hooks, if present, that do not hinge freely, seat properly or show evidence of permanent distortion.
- Excessive pitting or corrosion.
- Missing or illegible sling identification.
- Makeshift fasteners, hooks, or links formed from bolts, rods, etc.
- Mechanical coupling links in the body of the chain.
- Other damage that would cause a doubt as to the strength of the chain.

OPERATING PRACTICES

- The weight of the load must be known, calculated, estimated or measured. The loading on the slings will depend on where the center of gravity is located.
- Select sling having suitable characteristics for the type of load, hitch and environment.
- Slings shall not be loaded in excess of the rated capacity.
- Consideration shall be given to the sling load angle which affects rated capacity (See load chart Table 4 for Grade 100 (SPECTRUM 10®) and Table 5 for Grade 80 (SPECTRUM 8®).
- Never rig a sling with an angle less than 30 degrees to horizontal.
- Slings in a basket hitch should have the load balanced to prevent slippage.
- The sling shall be hitched in a manner providing control of the load.
- Never side load, back load, or tip load a hook.
- Always make sure the hook supports the load. The latch must never support the load.
- Read and understand Crosby hook and hook latch Warnings and Application Instructions.
- For two legged slings with angles greater than 90 degrees, use an intermediate link such as a master link or bolt type shackle to collect the legs of the slings. The intermediate link can 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.
- When using chain slings in choker applications, the Working Load Limit must be reduced by 20%. Crosby recommends a minimum angle of choke of 120 degrees (see Figure 1). Consult the manufacturer when planning to use an angle of choke less than 120 degrees. If Crosby A-1338 Cradle Grab hooks are used at the minimum angle of choke of 120 degrees, the full sling rated WLL can be utilized.

Figure 1

- When using chain slings in basket applications where the D/d (see figure 2) is less than 6, the rated load must be reduced by the values given in Table 1. This reduction does not eliminate the need to protect chain slings against damage caused by contact with edges, corners, or protrusions. Do not use a chain sling with a D/d that is less than two.

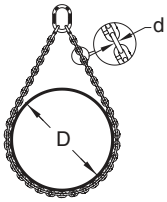


Figure 2

- In shortening applications, a 20% reduction of the Working Load Limit is required except when using the Crosby A-1338 Cradle Grab Hooks, S-1311 Chain Shortener Link, the A-1355 Chain Choker Hook in conjunction with the S-1325 Chain Coupler Link, or the Crosby ELIMINATOR® shortener link. They can be used without any reduction to the Working Load Limit.

- Slings should always be protected from being damaged by sharp corners.
- Slings should not be dragged on the floor or over abrasive surfaces.
- Chain sling links should not be twisted or kinked.
- Slings should not be pulled from under loads if the load is nesting on the sling.
- Slings that appear to be damaged should not be used unless inspected and accepted by designated person.
- All 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.
- Personnel shall stand clear of the suspended load.
- Personnel shall not ride the sling.
- Shock loading should be avoided.
- Twisting or kinking the legs (branches) should be avoided.
- During lifting, with or without the load, personnel should be alert for possible snagging.
- When using a basket hitch, the legs of the sling should contain or support the load from the sides, above the center of gravity, so that the load remains under control.
- Sling shall be long enough so that the rated capacity of the sling is adequate when the angle of the legs (branches) is taken into consideration (See Table 4 for Grade 100 Chain and Table 5 for Grade 80 Chain).

General Usage

It must be recognized that certain factors in the usage of chain and attachments can be abusive and lessen the load that the chain or attachments can withstand. Some examples are twisting of the chain; disfigurement; deterioration by straining, usage, weathering and corrosion; rapid application of load or jerking; applying excessive loads; sharp corner cutting, D/d, action and non-symmetrical loading effects.

Environmental Effects

- Excessive high or low temperatures or exposure to chemically active environments such as acid or corrosive liquids or fumes can reduce the performance of the chain and components.
- Extreme temperature will reduce the performance of alloy steel chain slings.
- Normal operating temperature is -40°C to 200°C (–40°F to 400°F).
- Reference temperature exposure chart to determine reduction of WLL due to operating at, and after exposure to, elevated temperatures (see Table 2 for Grade 80 Chain and Table 3 for Grade 100 chain).
- Chemically active environments can have detrimental affects on the performance of chain. The effects can be both visible loss of material and undetectable material degradation causing significant loss of strength.

Special Surface Coating/Plating/Galvanizing

- Chain should not be subjected to galvanizing, or any plating process. If it is suspected the chain has been exposed to chemically active environment, remove from service.

Table 1
Use of Crosby Chain with Diameter of Curvature Less Than 6

D/d	Reduction of Basket Hitch Rated Load
2	40%
3	30%
4	20%
5	10%
6 and above	none

Table 2
Grade 80 Crosby & Gunnebo Chain At Elevated Temperatures

Temperature of Chain (F°)	Temperature of Chain (C°)	Temporary Reduction of Rated Load at Elevated Temperature*	Permanent Reduction of Rated Load After Exposure to Temperature**
Below 400	Below 200	None	None
400	200	10%	None
500	260	15%	None
600	316	20%	5%
700	371	30%	10%
800	427	40%	15%
900	482	50%	20%
1000	538	60%	25%
Over 1000	Over 538	OSHA 1910.184 requires all slings exposed to temperatures over 1000° F to be removed from service.	

* The Crosby Group does not recommend the use of alloy chain slings at temperatures above 800° F.
** When chain slings are used at normal operating temperature after being heated to temperatures shown in the first column.

Table 3
Grade 100 Crosby & Gunnebo Chain At Elevated Temperatures

Temperature (F°)	Temperature (C°)	Temporary Reduction of Rated Load at Elevated Temperature*	Permanent Reduction of Rated Load After Exposure to Temperature**
Below 400	Below 200	None	None
400	200	15%	None
500	260	25%	5%
600	316	30%	15%
700	371	40%	20%
800	427	50%	25%
900	482	60%	30%
1000	538	70%	35%
Over 1000	Over 538	OSHA 1910.184 requires all slings exposed to temperatures over 1000 F to be removed from service.	

* The Crosby Group does not recommend the use of alloy chain slings at temperatures above 800° F.
** When chain slings are used at normal operating temperature after being heated to temperatures shown in the first column.

CHAIN INSPECTION
INSPECTION AND REMOVAL FROM SERVICE PER ASME B30.9

Refer to ASME B30.9-1.9 for further information

Frequent Inspection

a. A visual inspection for damage shall be performed by the user or designated person each day the sling is used.
b. Conditions such as those listed in ASME B30.9-1.9.4 Removal Criteria, or any other condition that may result in a hazard, shall cause the sling to be removed from service. Slings shall not be returned to service until approved by a qualified person.
c. Written records are not required for frequent inspections.

Periodic Inspection

a. A complete inspection for damage of sling shall be periodically performed by a designated person. Each link and component shall be examined individually, taking care to expose and examine all surfaces including the inner link surface. The sling shall be examined for conditions such as those listed in ASME B30.9-1.9.4 Removal Criteria, and a determination made as to whether they constitute a hazard.
b. Periodic Inspection Frequency: Periodic inspection intervals shall not exceed one year. The frequency of periodic inspections should be based on:
   1. Frequency of sling use.
   2. Severity of service conditions.
   3. Nature of lifts being made.
   4. Experience gained on the service life of slings used in similar circumstances.

Guidelines for the interval are:
1. Normal Service – yearly
2. Severe Service – monthly to quarterly
3. Special Service – as recommended by a qualified person

c. Written records of the most recent periodic inspection shall be maintained, and shall include the condition of the sling.

Removal Criteria

An alloy sling chain shall be removed from service if conditions such as the following are present:

a. Missing or illegible sling identification.
b. Cracks or breaks.
c. Excessive wear, nicks, or gouges. Minimum thickness on chain link shall not be below the values listed in Table 6.
d. Stretched chain links or components.
e. Bent, twisted, or deformed chain links or components
f. Evidence of heat damage.
g. Excessive pitting or corrosion.
h. Lack of ability of chain or components to hinge (articulate) freely.
i. Weld spatter.
j. For hooks, removal criteria as stated in ASME B30.10.
k. Other conditions, including visible damage, that cause doubt as to the continued use of the sling.

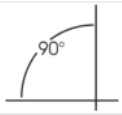
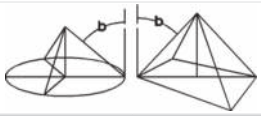
Repair

a. Slings shall be repaired only by the sling manufacturer or a qualified person.
b. A repaired sling shall be marked to identify the repairing agency per ASME B30.9 Section 9-1.7.
c. Chain and components used for sling repair shall comply with the provisions of ASME B30.9.
d. Repair of hooks shall comply with ASME B30.10.
e. Cracked, broken or bent chain links or components other than hooks shall not be repaired; they shall be replaced.
f. Mechanical coupling links shall not be used within the body of an alloy chain sling to connect two pieces of chain.
g. Modifications or alterations to the sling or components shall be considered as repairs and shall conform to all other provisions of ASME B30.9.
h. All repairs shall comply with the proof test requirements of ASME B30.9 Section 9-1.6.

Table 6
Minimum Allowable Chain Link Thickness at Any Point

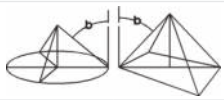
Nominal Chain Size		Minimum Thickness	
(in)	(mm)	(in)	(mm)
7/32	5.5	0.189	4.80
9/32	7	0.239	6.07
5/16	8	0.273	6.93
3/8	10	0.342	8.69
1/2	13	0.443	11.26
5/8	16	0.546	13.87
3/4	20	0.687	17.45
7/8	22	0.750	19.05
1	26	0.887	22.53
1-1/4	32	1.091	27.71
Refer to ASME B30.9			

Table 4
Grade 100 (Spectrum 10®) Alloy Chain Working Load Limit – 4 to 1 Design Factor

Nominal Size of Sling							
			Two Leg Slings		Triple and Four-Leg Slings		
(mm)	(in)	Single Leg t	0°<ß≤45° t	45°<ß≤60° t	0°<ß≤45° t	45°<ß≤60° t	Choker Hitch *t
6	7/32	1,40	2,00	1,40	3,00	2,12	1,12
7	1/4 (9/32)	2,00	2,80	2,00	4,20	3,00	1,60
8	5/16	2,50	3,55	2,50	5,30	3,75	2,00
10	3/8	4,00	5,60	4,00	8,00	6,00	3,20
13	1/2	6,70	9,50	6,70	14,0	10,0	5,35
16	5/8	10,0	14,0	10,0	21,2	15,0	8,00
19	3/4	14,0	20,0	14,0	30,0	21,0	11,2
22	7/8	18,8	26,5	18,8	39,4	28,0	15,0
23	7/8	21,0	29,5	21,0	44,4	31,5	16,8
26	1	27,0	38,0	27,0	57,0	40,0	21,2
32	1-1/4	40,0	56,0	40,0	85,0	60,0	32,5

* For choker applications, the Working Load Limit must be reduced by 20%. The Crosby A-1338 cradle grab hook and S1311N chain shortener link do not require any reduction of the Working Load Limit. The design factor of 4 to 1 on Spectrum® 10 Alloy Chain agrees with the design factor used by the International Standards Organization (I.S.O.) and ASME B30.9 and is the preferred set of Working Load Limit values to be used. Do not use sling angles of less than 30°.

Table 5
Grade 80 (Spectrum 8®) Alloy Chain Working Load Limit – 4 to 1 Design Factor

Nominal Size of Sling							
			Two Leg Slings		Triple and Four-Leg Slings		
(in)	(in)	Single Leg t	0°<ß≤45° t	45°<ß≤60° t	0°<ß≤45° t	45°<ß≤60° t	Choker Hitch * t
6	7/32	1,12	1,60	1,12	2,36	1,70	0,90
7	1/4 (9/32)	1,50	2,12	1,50	3,15	2,24	1,20
8	5/16	2	2,80	2	4,25	3	1,60
10	3/8	3,15	4,25	3,15	6,70	4,75	2,50
13	1/2	5,30	7,50	5,30	11,20	8	4,25
16	5/8	8	11,20	8	17	11,80	6,40
19-20	3/4	11,20	16	11,20	23,60	17	9
22	7/8	15	21,20	15	31,50	22,40	12
26	1	21,20	30	21,20	45	31,50	17
32	1-1/4	31,50	45	31,50	67	47,50	25,20

* For choker applications, the Working Load Limit must be reduced by 20%. The Crosby A-1338 cradle grab hook and S1311N chain shortener link do not require any reduction of the Working Load Limit. The design factor of 4 to 1 on Spectrum® 8 Alloy Chain agrees with the design factor used by the International Standards Organization (I.S.O.) and ASME B30.9 and is the preferred set of Working Load Limit values to be used. Do not use sling angles of less than 30°.

CROSBY ELIMINATOR®

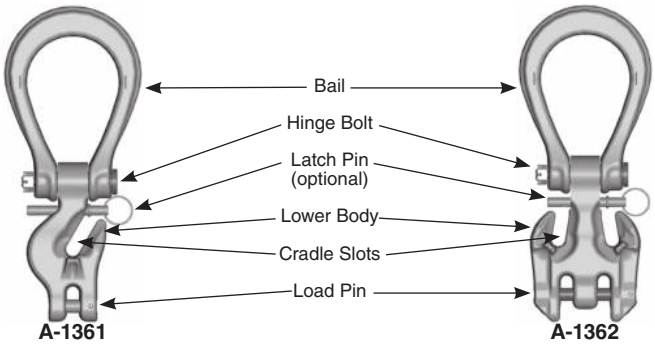
WARNING & APPLICATION INSTRUCTIONS

⚠WARNING

- **Failure to read, understand, and follow these instructions may cause death or serious injury.**
- **Read and understand these instructions before using the Crosby ELIMINATOR®.**
- **Incorrectly rigging or terminating exerts additional force or loading, which the Crosby ELIMINATOR® is not designed to accommodate.**

Crosby ELIMINATOR® Definitions

The **Crosby ELIMINATOR®** consists of a bail, hinge bolt, latch pin, and lower body with cradle slot/slots.



The **Crosby ELIMINATOR®** incorporates markings forged into the product which address a **QUIC-CHECK®** feature:

QUIC-CHECK®

Deformation Indicators – Two strategically placed marks on each leg of the bail, which allows for a **QUIC-CHECK®** measurement to determine if the bail 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 criteria, the **Crosby ELIMINATOR®** bail should be inspected further for possible damage.

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 ANSI B30.9.
- Remove from service any **Crosby ELIMINATOR®** components with a crack, nick, or gouge. The bail and body of a **Crosby ELIMINATOR®** with nick or gouge shall be repaired by a qualified person. The qualified person shall repair by grinding longitudinally following the contour of the forging, provided that the reduced dimension is within the limits shown in (Fig. A).

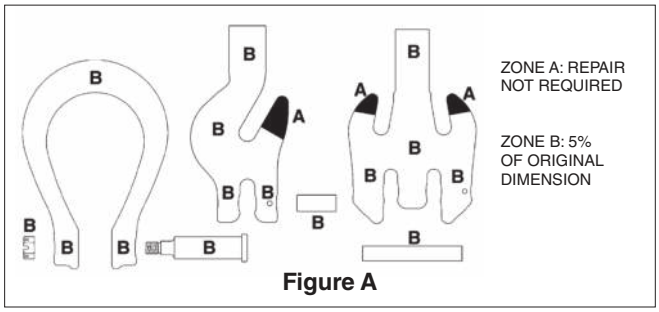


Figure A

- Never repair, alter, rework, or reshape a **Crosby ELIMINATOR®** by welding, heating, burning, or bending.
- **Crosby ELIMINATOR®** combination master link and chain shortener shall not be used in a manner other than that for which it is intended.
- The sling may be shortened by use of the cradle slot/slots (see Fig. C).
- In shortening applications, the **Crosby ELIMINATOR®** can be used without any reduction to the Working Load Limit.
- Never terminate (i.e. place a load bearing chain sling hook), or reeve load bearing chain through **Crosby ELIMINATOR®** bail (see Fig. B).
- Never exceed the rated capacity shown on sling's identification tag.
- Attach lifting device to ensure free fit of **Crosby ELIMINATOR®** bail (see Fig. D). Never allow lifting device to apply forces on side of bail (see Fig. E), as this condition will damage and reduce the capacity of the **Crosby ELIMINATOR®.**
- The **Crosby ELIMINATOR®** is intended for tension or pull. Side loading must be avoided, as it exerts additional force or loading which the product is not designed to accommodate (see Fig. F).

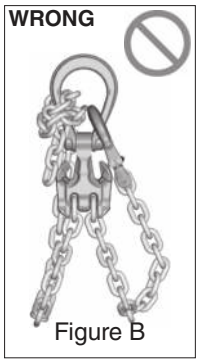


Figure B

Figure C

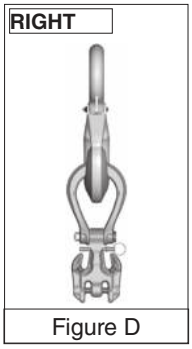


Figure D

Figure E

Figure F

- Never use a **Crosby ELIMINATOR®** where the bail shows signs of deformation or overloading (see Table 1).
- Read and understand the other sections of the ALLOY STEEL CHAIN SLINGS Warning, Selection, Use & Maintenance Information.

TABLE 1
Crosby ELIMINATOR® Bail Dimensions

Chain Size (in)	Chain Size (mm)	Frame I.D. Code	Inside Length (mm)	Inside Width (mm)	Jaw Width (mm)	QUIC-CHECK® Dim (mm)
1/4 - 5/16	7 - 8	2	98.6	76.2	23.9	88.9
3/8	10	3	122	88.9	28.7	102
1/2	13	4	152	105	33.3	127
5/8	16	5	174	121	41.4	152

- A **Crosby ELIMINATOR®** under load shall be allowed to self-align itself about the hinge pin.
- The use of a latch may be mandatory by regulations or safety codes; e.g. OSHA, MSHA, ASME B30.10 and B30.9.
- If Crosby latch pin is present, it should fit and function properly, and show no signs of distortion or bending.
- Always make sure the chain is seated in the cradle slot, and the cradle supports the load. The latch pin must never support the load.
- Latch pins are not intended to be an anti-fouling device.
- Use only genuine Crosby repair and latch pins parts.

A-1361 Single Leg Crosby ELIMINATOR®

- The A-1361 single leg **Crosby ELIMINATOR®** is designed to support a single leg vertical load. The cradle slot may be used to make a loop in the leg (see Fig. G). However, the Working Load Limit is still limited to the single leg values shown in Table 4 (Grade 100) and Table 5 (Grade 80).
- To produce a single basket hitch and achieve the full Working Load Limit, use only one length of chain with both ends terminated into the load pins of two A-1361 single leg **Crosby ELIMINATOR®** fittings (see Fig. H). Basket may be shortened with cradle slot.
- Never exceed the single leg Working Load Limit shown in Table 4 (Grade 100) and Table 5 (Grade 80) for an individual A-1361 **Crosby ELIMINATOR®** fitting.

Figure G

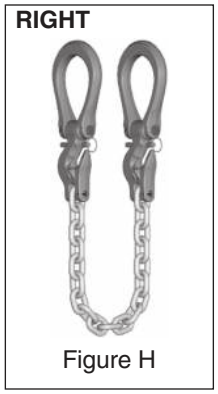


Figure H

A-1362 Double Leg Crosby ELIMINATOR®

- The A-1362 double leg **Crosby ELIMINATOR®** is designed to support symmetrically loaded double leg slings at 60, 45, and 30 degree horizontal angles. The cradle slots may be used to make loops in the legs (see Fig. J). However, the Working Load Limit is limited to the double leg values shown in Table 4 (Grade 100) and Table 5 (Grade 80).
- To produce a single basket hitch, and achieve the full Working Load Limit, use only one length of chain with both ends terminated into the load pin (see Fig. K). Basket may be shortened with the cradle slot or slots.
- To produce a double basket hitch and achieve the full Working Load Limit, two A-1362 double leg **Crosby ELIMINATOR®** fittings must be used, with both being terminated at their load pin (see Fig. L).
- Never exceed the double leg / single basket Working Load Limit on an individual A-1362 **Crosby ELIMINATOR®** fitting.

Figure J

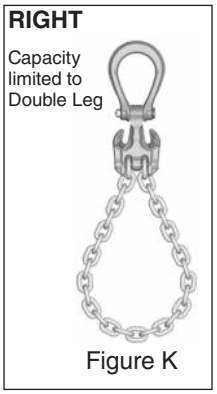


Figure K

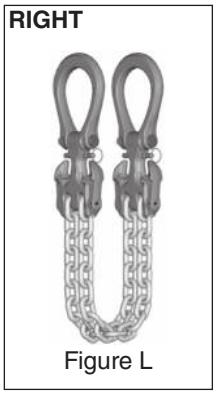


Figure L

Alloy Fittings Application and Information

HOW TO ASSEMBLE AN S-1325 COUPLER LINK ONTO MASTER LINK

1. Slide Coupler Link over Engineered Flat of Master Link.

2. Rotate Coupler Link so that clevis fitting is to the outside of Master Link and attach to chain sling.

HOW TO ASSEMBLE A CROSBY CLEVIS TYPE FITTING

1. Place chain link into clevis of chain coupler. Insert pin fully into the clevis ears.

2. Place the coupler link on its side and using a hammer, drive the locking pin into the clevis ear until it is flush with the outside surface.

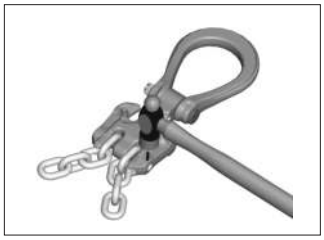
HOW TO ASSEMBLE A LOK-A-LOY® CONNECTING LINK

1. Place the locking sleeve between the assembled half link forgings.

2. Drive the pin through the assembled link ends and sleeve until the end of the pin is flush with the outside of the connecting link halves.

HOW TO ASSEMBLE LOAD PIN IN CROSBY ELIMINATOR® FITTINGS

1. Place both chain links into clevis slots of fitting, insert pin fully into the two-leg clevis.



2. Place Eliminator assembly on a firm surface. Using a hammer, drive the locking pin into the two-leg clevis until it is flush with the top of the hole.

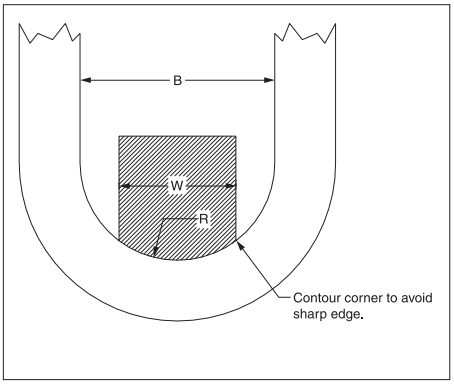


Figure 1

Crosby master links and master link assemblies are proof tested with special fixtures in accordance with ASTM A952 and EN-1677-4. The purpose of the special fixture is to prevent localized point loading during the proof test. Point loading at the proof test load may result in permanent deformation. ASTM A952 allows for a maximum proof test fixture width (W) of 60% of the inside width (B) of the master link. EN 1677-4 allows for a maximum proof test fixture width (W) of 70% of the inside width (B) of the master link. The radius of the fixture (R) is one-half of inside width of the master link. A sketch showing an example of the special fixture is shown in Figure 1. Note that the corner of the fixture should be contoured so that a sharp edge does not make contact with the master link during the loaded condition.

Over the years some master links and master link assemblies have changed dimensions and working load limits. Special consideration should be given to the actual inside width of the master link being tested and its correct allowable proof load value. If the correct allowable proof load value is in question, then Crosby Engineering should be consulted for the appropriate proof load value.

Grade 80 & 100 Alloy Chain

WORKING LOAD LIMIT

The "Working Load Limit" is the maximum load in pounds which should ever be applied to chain, when the chain is new or in as-new condition, and when the load is uniformly applied in direct tension to a straight length of chain.

PROOF TEST

The "Proof Test" is a term designating the tensile test applied to new chain for the sole purpose of detecting injurious defects in the material or manufacture. It is the load that the chain has withstood under a test in which the load has been applied in direct tension to a straight length of chain.

MINIMUM ULTIMATE LOAD

The "Minimum Ultimate Load" is the minimum load at which new chain will break when tested by applying direct tension to a straight length of chain at a uniform rate of speed in a testing machine.

ATTACHMENTS

Any attachments, such as hooks or links, should have a rated "Working Load Limit" at least equal to the chain with which it is used.

SYMMETRICAL LOADING

Rated Working Load Limit assumes symmetrical loading of all sling legs.

SPECIFICATIONS: ASME B30.9 2006

Paragraph 9-1.6.1 "Prior to initial use, all new and repaired chain and components of an alloy steel chain sling, either individually or as an assembly, shall be proof tested by the sling manufacturer or qualified person."

CAUTION

Only Crosby Alloy chain, Spectrum 8® or Spectrum 10®, should be used for overhead lifting applications.

General Usage – It must be recognized that certain factors in the usage of chain and attachments can be abusive and lessen the load that the chain or attachments can withstand. Some examples are twisting of the chain; disfigurement; deterioration by straining, usage, weathering and corrosion; rapid application of load or jerking; applying excessive loads; sharp corner cutting action and non-symmetrical loading effects.

When using chain slings in choker applications, the Working Load Limit must be reduced by 20%. Crosby recommends a minimum angle of choke of 120 degrees. Consult Crosby when planning to use an angle of choke of less than 120 degrees. If Crosby A-1338 cradle grab hooks are used at a minimum angle of choke of 120 degrees, the full sling rated WLL can be utilized.

In shortening applications, a 20% reduction of the Working Load Limit is required except when using the Crosby A-1338 Cradle Grab Hooks, S-1311 Chain Shortener Link, the A-1355 Chain Choker Hook in conjunction with the S-1325 Chain Coupler Link, or the Crosby ELIMINATOR® shortener link. They can be used without any reduction to the Working Load Limit.

Care should be taken to observe these derated applications or chain may fracture or permanently stretch at loads less than the advertised chain ultimate strength and proof load respectively.

Environmental Effects – Excessive high or low temperatures, or exposure to chemically active environments such as acids or corrosive liquids or fumes, can reduce the performance of the chain.

Temperature

- Extreme temperatures will reduce the performance of alloy steel chain slings.
- Normal operating temperature is -40° C to 204° C (-40° F to 400° F).
- See the temperature exposure chart (Table 1) to determine reduction of WLL due to operation at, and exposure to, elevated temperatures.

Chemically Active Environments can have detrimental effects on the performance of chain. The effects can be both visible loss of material and undetectable material degradation causing significant loss of strength.

- Usage Exposure – Exposure to chemically active environments such as acids or corrosive liquids or fumes can reduce the performance of the chain.
- Special Surface Coating/Plating/Galvanizing – Chain should not be subjected to galvanizing, or any plating process.
- If it is suspected that the chain has been exposed to chemically active environment, remove from service.

TABLE 1
Use of Crosby Alloy Chain at Elevated Temperatures

Temperature of Chain		Grade 8 (80) Chain		Grade 10 (100) Chain	
(F°)	(C°)	Temporary Reduction of Rated Load at Elevated Temperature*	Permanent Reduction of Rated Load After Exposure to Temperature**	Temporary Reduction of Rated Load at Elevated Temperature*	Permanent Reduction of Rated Load After Exposure to Temperature**
Below 400	Below 200	None	None	None	None
400	200	10%	None	15%	None
500	260	15%	None	25%	5%
600	316	20%	5%	30%	15%
700	371	30%	10%	40%	20%
800	427	40%	15%	50%	25%
900	482	50%	20%	60%	30%
1000	538	60%	25%	70%	35%
Over 1000	Over 538	OSHA 1910.184 and ASME B30.9 requires all slings exposed to temperatures over 1000° F to be removed from service.			

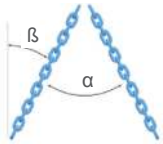
* Crosby does not recommend the use of Alloy Chain at temperatures above 800° F.

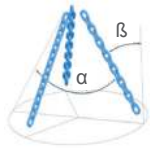
** When chain is used at room temperature after being heated to temperatures shown in the first column.

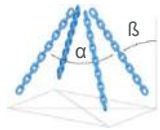
Working load limits - Europe

WLL tonnes Grade 10 GrabiQ

Based on EN 818-4:2008 WLL+25%





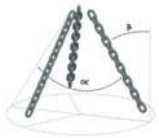
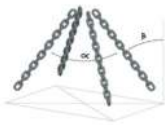
Sling type	1-leg	2-leg		3- and 4-leg		Choke Hitch
Condition of use	Straight	ß 0-45° α 0-90°	ß 45-60° α 90-120°	ß 0-45° α 0-90°	ß 45-60° α 90-120°	Endless sling in choke hitch
Load factor	1	1.4	1	2.1	1.5	1.6
Chain size						
6	1.4	2	1.4	3	2.12	2.24
7	1.9	2.65	1.9	4	2.8	3
8	2.5	3.55	2.5	5.3	3.75	4
10	4	5.6	4	8	6	6.3
13	6.7	9.5	6.7	14	10	10.6
16	10	14	10	21.2	15	16
18	12.5	18	12.5	26.5	19	20
19	14	20	14	30	21.2	22.4
20	16	22.4	16	33.5	23.6	25
22	19	26.5	19	40	28	30
23	21.2	28	21.2	42.5	31.5	33.5
26	26.2	37.5	26.5	56	40	42.5
28	31.5	42.5	31.5	63	45	50
32	40	56	40	85	60	63

Safety factor 4:1. Working load limits are based upon equally loaded and disposed sling legs.

WLL tonnes Grade 8 Classic

EN 818-4:2008




Sling type	1-leg	2 -leg		3- and 4-leg		Choke Hitch
Condition of use	Straight	ß 0-45° α 0-90°	ß 45-60° α 90-120°	ß 0-45° α 0-90°	ß 45-60° α 90-120°	Endless sling in choke hitch
Load factor	1	1.4	1	2.1	1.5	1.6
Chain size						
6	1.12	1.6	1.12	2.36	1.7	1.8
7	1.5	2.12	1.5	3.15	2.24	2.5
8	2	2.8	2	4.25	3	3.15
10	3.15	4.25	3.15	6.7	4.75	5
13	5.3	7.5	5.3	11.2	8	8.5
16	8	11.2	8	17	11.8	12.5
18	10	14	10	21.2	15	16
19	11.2	16	11.2	23.6	17	18
20	12.5	17	12.5	26.5	19	20
22	15	21.2	15	31.5	22.4	23.6
23	16	23.6	16	35.5	25	26.5
26	21.2	30.0	21.2	45	31.5	33.5
28	25	33.5	25	50	37.5	40
32	31.5	45.0	31.5	67	47.5	50

Safety factor 4:1. Working load limits are based upon equally loaded and disposed sling legs.

Rules for correct WLL

Where choke hitch is employed, the WLL of the chain sling should be reduced by 20 % (unless the LK choker hook is used).

Asymmetrical loading conditions

For unequally loaded chain slings, the following is recommended:

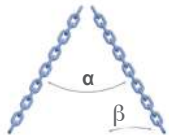
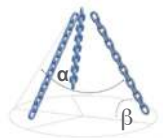
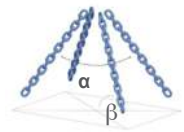
- A two-legged system is treated as a single-legged system.
- A three- or four-legged system is treated as a two-legged system.

Working Load Limits - United States

WLL t Grade 10 GrabiQ

Working Load Limits in pounds for chain slings grade 10, according to NACM

Based on A 906/A 906M-2

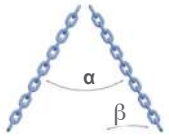
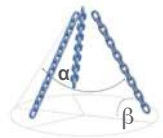
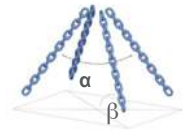
		1-leg	2-leg			3- and 4-leg		
								
Chain size (mm)	Chain size (in)	WLL (t)	α 60°	α 45°	α 30°	α 60°	α 45°	α 30°
6	-	1.40	2.42	3.43	3.43	3.64	2.97	2.10
7	9/32"	1.95	3.40	2.75	1.95	5.05	4.15	2.95
8	5/16"	2.60	4.50	3.70	2.60	6.75	5.50	3.90
10	3/8"	4.00	6.95	5.65	4.00	10.40	8.50	6.00
13	1/2"	6.80	11.80	9.60	6.80	17.65	14.45	10.20
16	5/8"	10.30	17.75	14.50	10.30	26.65	21.75	15.40
20	3/4"	16.00	27.70	22.60	16.00	41.55	33.95	24.00
22	7/8"	19.40	33.50	27.35	19.40	50.25	41.05	29.05
26	1"	27.10	46.94	38.33	27.10	70.41	57.49	40.65
32	1-1/4"	40.00	69.28	56.57	40.00	103.90	84.90	60.00

Note 1: α is sling angle defined as angle measured between the horizontal plane and the legs of the sling.
Note 2: WLL based upon equally loaded and disposed sling legs.

WLL t Grade 8 Classic

Working Load Limits in pounds for chain slings grade 8, according to NACM

Based on A 906/A 906M-2

		1-leg	2-leg			3- and 4-leg		
								
Chain size (mm)	Chain size (in)	WLL (t)	α 60°	α 45°	α 30°	α 60°	α 45°	α 30°
6	-	1.12	1.94	1.58	1.12	2.91	2.38	1.68
7	9/32"	1.60	2.75	2.25	1.60	4.15	3.40	2.40
8	5/16"	2.00	3.55	2.90	2.00	5.35	4.35	3.10
10	3/8"	3.20	5.50	4.50	3.20	8.30	6.80	4.80
13	1/2"	5.40	9.45	7.70	5.40	14.15	11.55	8.20
16	5/8"	8.20	14.20	11.60	8.20	21.30	17.40	12.30
19	3/4"	11.20	19.40	15.84	11.20	29.10	23.76	16.80
20	3/4"	12.80	22.25	18.15	12.80	33.40	27.25	19.30
22	7/8"	15.50	26.85	21.90	15.50	40.25	32.90	23.25
26	1"	21.60	37.50	30.60	21.60	56.25	45.95	32.50
32	1-1/4"	32.80	56.80	46.40	32.80	85.20	69.60	49.20

Note 1: α is sling angle defined as angle measured between the horizontal plane and the legs of the sling.
Note 2: WLL based upon equally loaded and disposed sling legs.

Working load limits - Australia

WLL tonnes Grade 10 GrabiQ

Based on AS 3775.2:2014

Sling type	1-leg			2-, 3- and 4-leg				Basket Slings		GrabiQ home pocket loop		
Condition of use	Straight	Adjustable with no deration	Reeved sling (Choke)	Straight 60°	Straight 90°	Straight 120°	Reeved (Choke) Max angle 60°	1-leg	2-leg	1-leg α max 30°	2-,3- and 4-leg 60° α max 30°	2-,3- and 4-leg 90° α max 30°
Load factor	1	1	0.75	1.73	1.41	1	1.3	1.3	2.25	1	1.73	1.41
Chain size												
6	1.4	1.4	1.1	2.4	2	1.4	1.8	1.8	3.4	1.5	2.6	2.1
7	1.9	1.9	1.4	3.3	2.7	1.9	2.5	2.5	4.3	2	3.3	2.7
8	2.5	2.5	1.9	4.3	3.5	2.5	3.3	3.3	5.9	2.6	4.5	3.7
10	4	4	3	6.9	5.6	4	5.2	5.2	9	4	6.9	5.6
13	6.7	6.7	5	11.6	9.4	6.7	8.8	8.8	15.3	6.8	11.8	9.6
16	10	10	7.5	17.3	14.1	10	13	13	23.2	10.3	17.8	14.5
20	16	16	12	27.7	22.6	16	20.8	20.8	36	-	-	-
22	19	19	14.3	32.9	26.8	19	24.7	24.7	45	-	-	-
26	26.5	26.5	19.9	45.8	37.4	26.5	34.5	34.5	60.7	-	-	-
32	40	40	30	69.2	56.4	40	52	52	90	-	-	-

Note 1: Advice regarding the appropriate deration should be sought by the manufacturer
Note 2: The determination of the angle of the multi-leg sling is the largest angle at the apex of the configuration
Note 3: Reeved (choke) slings and basket slings, in a two leg configuration have a maximum angle for us of 60°
Note 4: In the 2-leg basket sling, the master link to be used shall be of an appropriate WLL and with intermediate links. This ensures that the factor 2,25 can be accommodated and that there is no overcrowding with back hooking.
Note 5: For engineered lifts, see Clause 7.2.2 in AS 3775.2:2014

WLL tonnes Grade 8 Classic in Australia

Based on AS 3775.2:2014

Sling type	1-leg			2-, 3- and 4-leg				2-leg
Condition of use	Straight	Adjustable with no deration	Reeved sling (Choke)	Straight β 60°	Straight β 90°	Straight β 120°	Reeved (Choke) Max angle 60°	Basket
Load factor	1	1	0.75	1.73	1.41	1	1.3	2.25
Chain size								
6	1.1	1.1	0.8	1.9	1.6	1.1	1.5	2.5
7	1.5	1.5	1.1	2.6	2.1	1.5	2	3.4
8	2	2	1.5	3.5	2.8	2	2.6	4.5
10	3.2	3.2	2.4	5.5	4.5	3.2	4.1	7.2
13	5.3	5.3	4	9.2	7.5	5.3	6.9	11.9
16	8	8	6	13.8	11.3	8	10.4	18
19	11.2	11.2	8.4	19.4	15.8	11.2	14.6	25.2
20	12.5	12.5	9.4	21.6	17.6	12.5	16.3	28.1
22	15	15	11.3	26	21.2	15	19.5	33.8
26	21.2	21.2	15.9	36.7	29.9	21.2	27.6	47.7
32	31.5	31.5	23.6	54.5	44.4	31.5	41	70.9

Note 1: Advice regarding the appropriate deration should be sought by the manufacturer
Note 2: The determination of the angle of the multi-leg sling is the largest angle at the apex of the configuration
Note 3: Reeved (choke) slings and basket slings, in a two leg configuration have a maximum angle for us of 60°
Note 4: In the 2-leg basket sling, the master link to be used shall be of an appropriate WLL and with intermediate links. This ensures that the factor 2,25 can be accommodated and that there is no overcrowding with back hooking.
Note 5: For engineered lifts, see Clause 7.2.2 in AS 3775.2:2014

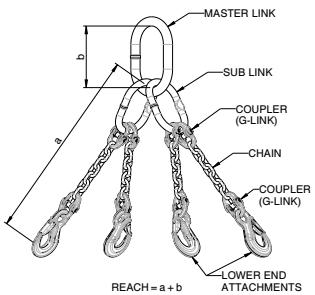
Tips for chain sling assembly

General

1. The reach of the sling is the length measured from the load bearing surface of the master link to the load bearing surface of the hook or lower terminal (as shown in illustrations).
2. A metal ID tag must always be attached to a chain sling, showing serial number, size, reach, Working Load Limit at angle of lift and manufacturer.
3. Each sling manufactured shall have a completed certificate of test provided to user.

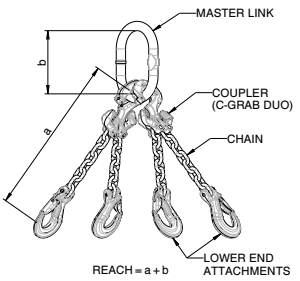
Classic chain slings

4. Single Leg Sling
   If the required measurement falls in the middle of a link, the next link is cut.
5. Double Leg Sling (clevis system)
   Cut chain to length and count the links. You must have an even number of links so hooks hang in the correct plane. Hooks should always point out, as shown in diagram.
6. Triple or Quadruple Leg Sling (clevis system)
   Cut chain to length and count the links. You must have an odd number of links so hooks hang in the correct plane. Hooks should always point out, as shown in diagram. If the measurement falls in the middle of a link, the next link that produce an odd number is cut.



GrabiQ chain slings

7. It is a common practice, when possible, to keep all hooks in the same plane as the master link. This is easily accomplished on 1, 2, & 4 leg slings. It is not possible with 3-leg GrabiQ slings when single and dual fittings are mixed.
8. It is a common practice, when possible, to attach hooks so that latches point away from the master link.
9. Mixing GrabiQ fittings: Adding two additional chain links to the CL & CLD gives the same effective reach as CG & CGD. The MG & MGD have the same effective reach.
10. Normally, the master link will have a maximum of two connecting links, CG, CGD, CL, or CLD. The maximum number of connecting links that can ever be mounted on a single master link is three, when constructing a double leg basket.



11. A GrabiQ sling can never have more than four independent legs or two basket legs.
12. Attaching CG, CGD, CL, & CLD connectors to MF and MFX Master Links: Insert the connector onto the master link at the engineered flat. C-Connecting links are normally attached to the master link using the Dismountable Connecting Set type CS or the Permanent Connecting Set type CP. Each C-Connector includes one solid retainer pin, 1 larger rolled spring keeper pin and 1 smaller rolled spring keeper pin. When the dismountable connecting set is used the sling can be disassembled for repair. The permanent connecting set cannot be disassembled for repair.
    a. CS – First install the solid retainer pin. Second drive the smaller rolled spring keeper pin through the hole provided at a right angle to the solid retainer pin. The fit should be very snug.
    b. CP – First install the solid retainer pin. Second drive the larger rolled spring keeper pin into the same hole, directly behind solid retainer pin. The fit should be very snug.

Technical Information

Chain Manufacturing - Quality and Strength Requirements

Chains are divided into grades based on minimum nominal breaking stress.

Chain Grade	Surface treatment	Code	Minimum breaking stress N/mm²	Load factors			Typical use
				WLL	MPF	Breaking force	
8	Yellow U Black B Hot Dipped Galvenized Z	KL	800	1	2.5	4	General lifting (KL), Container lashing (LL). Extra heavy towing (ML), Lashing (KL, LL). Fishing (KL, ML, LL)
		ML	800	-	1	4	
		LL	800	-	1	4	
10	Blue A	KL	1000	1	2.5	4	General lifting

Testing and Quality Control- GrabiQ & Classic Chain (Grade 10 & 8)

In each step of the manufacturing of the chain, our systematic quality monitoring will ensure the highest safety and the longest life span in the product. Here are some especially important aspects of quality:

Material

The incoming material is supplied with test certificates only from qualified manufacturers and according to our stated material specifications.

Manufacturing

During forming and welding, the operators continuously control that the links meet the specified dimensions both before and after welding.

Single link samples are continuously mandrel tested on the weld. Shape, dimensions and deburring are then inspected visually.

Sample lengths are heat treated and then destruction load tested. Following these tests, the chain is heat treated.

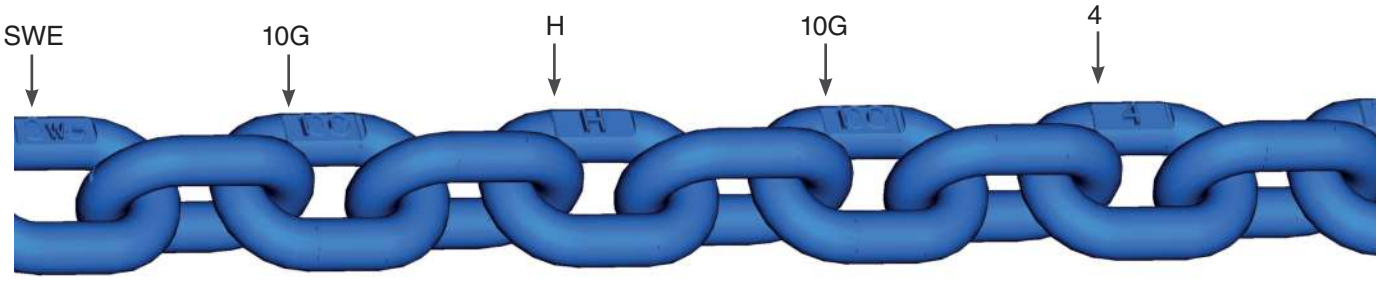
Hardening and tempering is carried out continuously in computer controlled induction furnaces with regular samplings.

Proof Force

The entire chain is test loaded. The manufacturing proof force for short link chain is 2.5 times the permitted working load limit. This gives the chain high safety in use. The chain is then visually inspected and cut into delivery lengths. A sample is taken from every length and tested to destruction. Dimensions and shape are also checked. All results are documented.

Marking and Traceability

The international standards for lifting chain require that the chain is marked with Grade and Manufacturers ID. On our chain we stamp “SWE - 10G - H - 10G - 4”, where the “H” and the “4” is the combination for the traceability code. In case of the unlikely event of chain failure, we can trace the specific chain link back to the very batch and raw material as well as the year and place of manufacture. Each individual delivery length also has its unique batch number.



Use

- Never lift with a twisted chain.
- Use shortening hooks, knotting is not allowed.
- Use edge protectors to prevent sharp edges from damaging the chain.

See website or user instructions for assembly instructions.

Meets listed current specifications and standards at time of publication of this catalog.

Maintenance

Periodic thorough examination must be carried out at least every 12 months or more frequently according to local statutory regulations, type of use and past experience.

1. Overloaded chain slings must be taken out of service.
2. Chain and components including load pins which have been damaged, deformed, elongated, bent or showing signs of cracks
   or gouges shall be replaced. Carefully grind away small nicks and burrs.
3. Additional testing by magnetic particle inspection and/or proof loading at max. 2 x WLL may be carried out. The wear of the chain and component shall in no place exceed 10% of the original dimensions.
4. The chain link wear - max. 10% - is defined as the reduction of the mean diameter measured in two directions.

Severe Environment

Chain and components must not be used in alkaline (>pH10) or acidic conditions (<pH6). Comprehensive and regular examination must be carried out when used in severe or corrosive inducing environments. In uncertain situations consult your Gunnebo Industries dealer.

Extreme Temperature Conditions

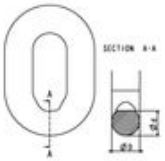
The in service temperature effects the WLL as following :

Temperature (°C)	Reduction of WLL			
	Grade 10 chain (400)	Grade 10 chain (200)	Grade 10 components	Grade 8 chain & components
-40 to +200 °C	0 %	0 %	0 %	0 %
+200 to +300 °C	10 %	Not allowed	10 %	10 %
+300 to +400 °C	25 %	Not allowed	25 %	25 %

After short heat exposure, maximum one hour, the sling reverts to its full capacity. Upon return to normal temperature, the sling reverts to its full capacity within the above temperature range. Chain slings should not be used above or below these temperatures. **For chain grade 10(200) the maximum in service temperature is 200° C.**

Definitions

Proof force:
Each individual chain link is tested to the Manufacturing Proof Force (MPF) level before delivery. The MPF level is 2.5 times the WLL, equal to 62.5% of the Minimum Breaking Force.



$$\frac{D+d}{2} > 0.9d_n$$

Breaking force (BF):
The highest static force a chain is exposed to during test loading before breaking.

Working load limit (WLL):
The maximum permitted load on a lifting chain under normal (vertical) lifting conditions.

Total ultimate elongation:
The elongation of the test item, relative to the original length, at the moment of breaking.

Scope

This procedure is provided to give instructions for installation of wire rope into the Crosby® SB-427B Spelter Button using WIRELOCK® socketing material, or zinc socketing material. **Additionally, instructions regarding the reuse of spelter buttons are included.** The spelter button is part of a socket assembly that includes a socket basket, pin, cotter pin and button. If there are any questions regarding these instructions, please contact The Crosby Group LLC at (918) 834-4611 and request technical assistance.

NOTE: Many high performance ropes require special attention to prevent rope damage during cutting, seizing and brooming in preparation for the speltering operation. Attention to the special instructions is required to ensure proper termination efficiency. Consult rope manufacturer for specific details.

Installation

Install button on the rope so that the live end of the rope extends out of small inside diameter of the button. Broomed end of rope should be pulled into button and placed completely to the “MAX FILL” line marked on the button to ensure correct length of engagement with socketing material.

Socketing using WIRELOCK® Resin Material

Seizing, cleaning, brooming and preparation of wire rope and pouring of WIRELOCK® is to be carried out per instructions provided in the *Wire Rope End Terminations User’s Manual,* and *WIRELOCK® Warnings and Application Instructions* located on the WIRELOCK® Product or in the Crosby General Catalog.

Socketing Using Zinc Spelter Material

Seizing, cleaning, brooming and preparation of the wire rope, and pouring of zinc is to be carried out in accordance with recommendations of the Crosby® *Wire Rope End Terminations Manual* or other approved procedures.

Note: Before operation of the wire rope assembly, it is recommended that all poured sockets, whether with zinc or resin, be proof loaded to seat the cone.

Reuse Of Crosby® Spelter Buttons

The following are general guidelines for the reuse of a Crosby® SB-427B Button. The use and inspection of used buttons are the responsibility of the user.

Procedure For Removing Spelter Cone

- Cut the rope close (½”) to the nose end of the button and press the cone out of the button.
- For metallurgical, medical and environmental reasons, we do not recommend the use of heat to remove the spelter cone.
  - However, if this is the only means available for removing the zinc cone, care should be taken not to exceed 450˚C (850˚F) surface temperature. The preferred method would be a slow heat in a temperature controlled oven. If a torch (rosebud)is used, the heated area shall be monitored with a Tempil stick or a temperature indicator to prevent localized heating from exceeding the 450˚C (850˚F) limit.
  - To remove a WIRELOCK® cone, heat the surface of the button to 177˚C (350˚F) (do not exceed the 450˚C (850˚F) limit for any localized hot spot). Leave for 5-10 minutes, then drive the cone out with a hammer and drift.

Selection Of Buttons For Reuse

- Use only buttons that:
  - Do not show discoloration from excessive heating.
  - Do not show any signs of welding.
  - Select only buttons that have been cleaned and have passed a Magnetic Particle Inspection by a qualified technician (level II ASNT-SNT-TC-1A-88) per ASTM E709. Acceptance criteria shall be per ASTM E125, Types II-VIII, Degree 1. No cracks are acceptable.
  - Select only buttons that do not show any signs of overloading or wear.
  - Select buttons that are free from nicks, gouges and abrasions. Indications may be repaired by lightly grinding until surfaces are smooth, provided they do not reduce the dimensions by more then 10% of the nominal catalog dimension.
  - Select buttons that are not distorted, bent or deformed.

NOTE: Buttons having any of the indications as outlined above shall not be reused.

CROSBY® FORGED WIRE ROPE CLIP WARNINGS & 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.**
- **Match the same size clip to the same size wire rope.**
- **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 retighten nuts to recommended torque (See Table 1).**
- **The reuse of clips is discouraged. As recommended by Crosby, have qualified personnel inspect product before use.**

Efficiency ratings for wire rope end terminations are based upon the minimum breaking force 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 1) is based upon using RRL or RLL wire rope, 6 x 19 or 6 x 37 Class, FC or IWRC; IPS or XIP, XXIP. If Seale construction or similar large outer wire type construction in the 6 x 19 Class is to be used for sizes 1 inch 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, XXIP sizes 1-1/2 inch and smaller; and to rotation-resistant RRL wire rope, 19 x 7 Class, IPS, XIP, XXIP sizes 1-1/2 inch and smaller.

For other wire rope manufacture designs not mentioned above, we recommend contacting Crosby Engineering at the address or telephone number on the back cover to ensure the desired efficiency rating.

The style of 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 1 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 (Never saddle a dead horse!). Use torque wrench to tighten nuts evenly, alternate from one nut to the other until reaching the recommended torque (See Figure 1).

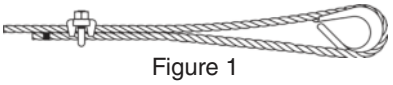


Figure 1

2. When two clips are required, apply the second clip as near the loop or thimble as possible. Use torque wrench to 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. (See Figure 2)

Figure 2

3. When three or more clips are required, space additional clips equally between first two – take up rope slack – use torque wrench to tighten nuts on each clip evenly, alternating from one nut to the other until reaching recommended torque (See Figure 3).

Figure 3

4. If a pulley (sheave) is used in place of a thimble, add one additional clip. Clip spacing should be as shown.

(See Figure 4)

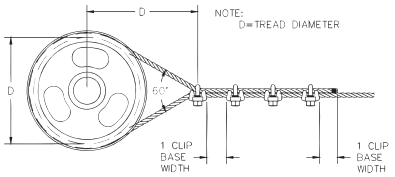


Figure 4

5. WIRE ROPE SPLICING PROCEDURES:

The preferred method of splicing two wire ropes together is to use inter-locking turnback eyes with thimbles, using the recommended number of clips on each eye

(See Figure 5).

Figure 5

An alternate method is to use twice the number of clips as used for a turnback termination. The rope ends are placed parallel to each other, overlapping by twice the turnback amount shown in the application instructions. The minimum number of clips should be installed on each dead end (See Figure 6). Spacing, installation torque, and other instructions still apply.

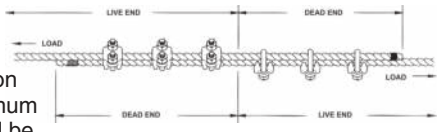


Figure 6

6. 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 use torque wrench to 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 1

Clip Size/ Rope Size (in)	Clip Size/ Rope Size (mm)	Minimum No. of Clips	Amount of Rope to Turn Back in mm	*Torque in Nm
1/8	3-4	2	85	6.1
3/16	5	2	95	10.2
1/4	6-7	2	120	20.3
5/16	8	2	133	40.7
3/8	9-10	2	165	61.0
7/16	11-12	2	178	68
1/2	13	3	292	88
9/16	14-15	3	305	129
5/8	16	3	305	129
3/4	18-20	4	460	176
7/8	22	4	480	305
1	24-25	5	660	305
1-1/8	28-30	6	860	305
1-1/4	33-34	7	1120	488
1-3/8	36	7	1120	488
1-1/2	38-40	8	1370	488
1-5/8	41-42	8	1470	583
1-3/4	44-46	8	1550	800
2	48-52	8	1800	1017
2-1/4	56-58	8	1850	1017
2-1/2	62-65	9	2130	1017
2-3/4	68-72	10	2540	1017
3	75-78	10	2690	1627
3-1/2	85-90	12	3780	1627

If a pulley (sheave) is used for turning back the wire rope, add one additional clip. See Figure 4.

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® FIST GRIP® CLIPS

WARNINGS & APPLICATION INSTRUCTIONS

New Style Fist Grip®
3/16" - 5/8"

Fist Grip® Clips
3/4" - 1-1/2"

⚠ WARNING

- **Failure to read, understand, and follow these instructions may cause death or serious injury.**
- **Read and understand these instructions before using clips.**
- **Match the same size clip to the same size wire rope.**
- **Do not mismatch Crosby clips with other manufacturer's 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 retighten nuts to recommended torque (See Table 1).**
- **The reuse of clips is discouraged. As recommended by Crosby, have qualified personnel inspect product before use.**

Efficiency ratings for wire rope end terminations are based upon the minimum breaking force 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 1) is based upon using RRL or RLL wire rope, 6 x 19 or 6 x 37 Class, FC or IWRC; IPS or XIP, XXIP. If Seale construction or similar large outer wire type construction in the 6 x 19 Class is to be used for sizes 1 inch 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, XXIP sizes 1-1/2 inch and smaller; and to rotation-resistant RRL wire rope, 19 x 7 Class, IPS, XIP, XXIP sizes 1-1/2 inch and smaller.

For other wire rope manufacture designs not mentioned above, we recommend contacting Crosby Engineering at the address or telephone number on the back cover to ensure the desired efficiency rating.

The style of 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 1 in following these instructions. Turn back specified amount of rope from thimble or loop.

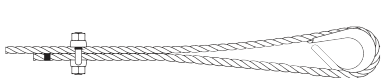


Figure 1

Apply first clip one base width from dead end of rope. Use torque wrench to tighten nuts evenly, alternating from one nut to the other until reaching the recommended torque (See Figure1).

2. When two clips are required, apply the second clip as near the loop or thimble as possible. Use torque wrench to 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. (See Figure 2)

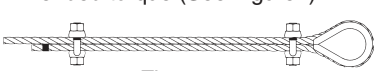


Figure 2

3. When three or more clips are required, space additional clips equally between first two – take up rope slack – use torque wrench to tighten nuts on each clip evenly, alternating from one nut to the other until reaching recommended torque (See Figure 3).

Figure 3

4. If a pulley (sheave) is used in place of a thimble, add one additional Fist Grip. Fist Grip spacing should be as shown. (See Figure 4)

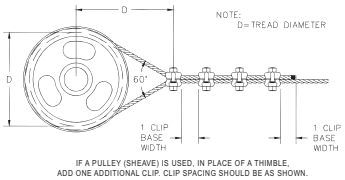


Figure 4

5. WIRE ROPE SPLICING PROCEDURES:

The preferred method of splicing two wire ropes together is to use inter-locking turnback eyes with thimbles, using the recommended number of clips on each eye (See Figure 5).

Figure 5

An alternate method is to use twice the number of clips as used for a turnback termination. The rope ends are placed parallel to each other, overlapping by twice the turnback amount shown in the application instructions. The minimum number of clips should be installed on each dead end (See Figure 6). Spacing, installation torque, and other instructions still apply.

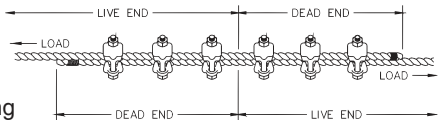


Figure 6

6. 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 use torque wrench to 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 1

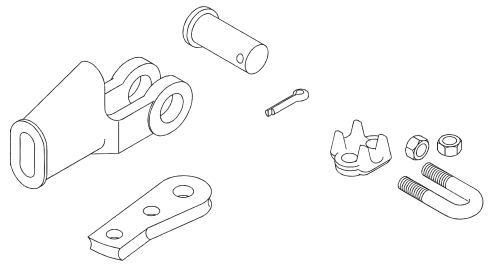
Clip Size/ Rope Size (in)	Clip Size/ Rope Size (mm)	Minimum No. of Clips	Amount of Rope to Turn Back in mm	*Torque in Nm
3/16	5	2	100	40.7
1/4	6-7	2	100	40.7
5/16	8	2	127	40.7
3/8	9-10	2	133	61.0
7/16	11-12	2	165	88.1
1/2	13	3	279	88.1
9/16	14-15	3	323	176
5/8	16	3	342	176
3/4	18-20	3	406	305
7/8	22	4	660	305
1	24-25	5	940	305
1-1/8	28-30	5	1040	488
1-1/4	32-34	6	1400	488
1-3/8	36	6	1400	488
1-1/2	38-40	7	1980	678

If a pulley (sheave) is used for turning back the wire rope, add one additional clip. See Figure 4.

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.

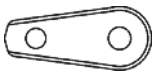
CROSBY TERMINATOR
WARNINGS & APPLICATION INSTRUCTIONS



S-421T / US-422T
"TERMINATOR"

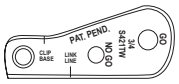
NOTE: The design of the basket for the S-421T 1-1/4" TERMINATOR Wedge Socket does not allow proper fit to the old style Crosby S-421W wedge (see Fig. 1). **Do not assemble or use.** The design of the basket for each US-422T TERMINATOR® Wedge Socket does not allow proper fit to the old style UWO-422 wedge (See Fig. 1). **Do not assemble or use.** All S-421T and US-422T TERMINATOR baskets are marked with a capital "T" or TERMINATOR .

Non TERMINATOR Wedge



S-421W
UWO-422

TERMINATOR Wedge



S-421TW
UWO-422T

Figure 1

QUIC-CHECK® "Go" and "No-Go" features cast into wedge. The proper size wire rope is determined when the following criteria are met:

QUIC-CHECK®

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.
- Do not mix and match wedges or pins between models or sizes.
- Always select the proper wedge and socket for the wire rope size.

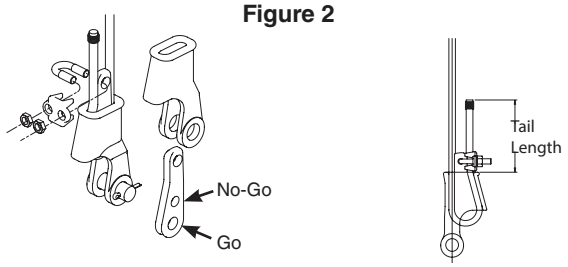
Assembly Safety

- 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 standard wire rope is not recommended. Seizing of the tail is preferred following the recommended practices of the wire rope manufacturer. The tail length of the dead end should be a minimum of 6 rope diameters but not less than 150 mm (See Figure 2).
- **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. Seizing of the tail is preferred following the recommended practices of the wire rope manufacturer. The tail length of the dead end should be a minimum of 20 rope diameters but not less than 150 mm (See Figure 2).
- Properly match socket, wedge and clip (See Table 1) to wire rope size.
- Align live end of rope, with center line of pin.(See Figure 2)
- Secure dead end section of rope. (See Figure 2)
- Tighten nuts on clip to recommended torque. (See Table 1)
- Do not attach dead end to live end or install wedge backwards (See Fig. 3).
- Use a hammer to seat Wedge and Rope as deep into socket as possible before applying first load.

⚠ WARNING

- **Loads may slip or fall if the Wedge Socket is not properly installed.**
- **Load misapplied in direct contact with the wedge can dislodge the wedge and cause loss of load.**
- **A falling 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.**
- **Do not interchange wedges between S-421T and US422T or between sizes.**
- **Do not assemble an old style 30-32mm (1-1/4") S-421W wedge into an S-421T 30-32mm (1-1/4") TERMINATOR basket.**
- **Do not assemble an old style UWO-422 wedge into a US-422T TERMINATOR basket.**
- **The reuse of clips is discouraged. As recommended by Crosby, have qualified personnel inspect product before use.**

Figure 2



*Tail Length	
Standard 6 to 8 Strand Wire Rope	**Rotation Resistant Wire Rope**
A minimum of 6 rope diameters, but not less than 150mm.	A minimum of 20 rope diameters, but not less than 150mm.

TABLE 1

Rope Size (mm)	9-10	11-13	14-16	18-19	20-22	24-26	28	32
Clip Size (in)	3/8	1/2	5/8	3/4	7/8	1	1-1/8	1-1/4
* Torque NM	61	88	129	176	305	305	305	488

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

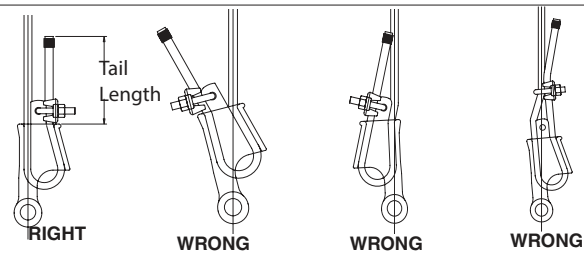


Figure 3

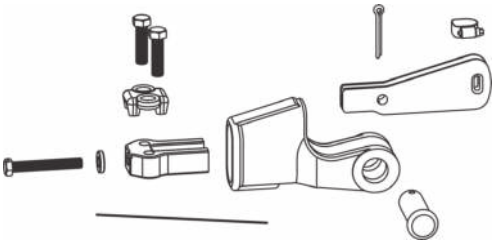
Operating Safety

- 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 or wedge with any other elements of the rigging (Called two blocking).
- Do not allow a direct load to contact the wedge.

SUPER TERMINATOR WEDGE SOCKET

WARNINGS & APPLICATION INSTRUCTIONS

US Patented 6,898,827.



S-423T SUPER TERMINATOR

The intended purpose of the SUPER TERMINATOR is to offer a Wedge Socket termination, which when assembled properly with high performance, high strength, compacted strand, rotation resistant wire rope will achieve an 80% termination efficiency. Due to the unique construction of these ropes, Crosby cannot make a broad general statement that all current and future designed ropes, when properly assembled with a SUPER TERMINATOR , will achieve a minimum 80% termination efficiency. (To determine the efficiency rating for a specific rope, contact Crosby Engineering at 918-834-4611.)

The SUPER TERMINATOR may be purchased as a complete Wedge Socket assembly or the Wedge assembly may be purchased for retrofit onto your Crosby S-421TW wedge socket basket.

The Crosby S-423TW SUPER TERMINATOR Wedge is designed to be assembled only into the Crosby S-421T socket basket. For the 30-32mm S-423T, assemble only on to S-421T basket marked TERMINATOR .

Important Safety Information - Read and Understand

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.
- Do not mix and match wedges or pins between models or sizes.
- Always select the proper wedge and socket for the wire rope size.

Assembly Safety

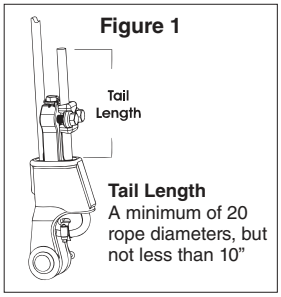
- Properly match socket and wedge assembly to wire rope size.
- Ensure the dead end is properly seized before inserting the wire rope into the wedge socket basket. High performance, high strength, compacted strand, rotation resistant wire ropes are sensitive to seizing methods. For specific seizing procedures, contact the wire rope manufacturer.
- The tail length of the dead end should be a minimum of 20 rope diameters but not less than 254mm (See Figure 1).
- Mount wedge socket basket in vice.
- Insert live end of wire rope into wedge basket, aligning live end of rope with center line of pin. Make a loop and return. (See Figure 2).
- Pull on live line to remove excess out of loop, leaving enough room to properly insert wedge into basket. (See Figure 3).
- Secure rope to SUPER TERMINATOR Wedge with clamp (See Figure 4).
- Pull Wedge and rope into basket until tensioner bolt, with washers properly applied, can engage threads in nose of wedge. Auxillary power may be required to fully pull wedge and rope into basket. (See Figure 5).
- Use torque wrench to tighten tensioner bolt to recommended torque value, properly seating wedge and rope into basket. Reference Table 1 for recommended Torque in N-m.
- Secure dead end section of rope with clip base. Tighten bolts to recommended torque values (See Table 1).
- Properly install wire to securely lock tensioner bolt to tensioner. (See Figure 6).
- Do not attach dead end to live end or install wedge backwards. (See Figure 7).

Operating Safety

- Proper application of the Super TERMINATOR eliminates the “first load” requirement of conventional wedge socket terminations.
- Efficiency rating of the Wedge Socket termination is based upon the catalog breaking strength of Wire Rope. The efficiency of a properly assembled Super Terminator on most high performance, high strength, compacted strand, rotation resistant ropes will achieve 80% of catalog breaking strength of rope, depending on the unique construction of these ropes. (To determine the efficiency rating for a specific rope, contact Crosby Engineering at 918-834-4611.)
- During use, do not strike the dead end section or wedge with any other elements of the rigging (Called two blocking).
- The SUPER TERMINATOR wedge socket may also be used with standard 6 to 8 strand and rotation resistant wire rope (special wire rope constructions with 8 or more strands).
- Do not allow direct load to contact the wedge.

⚠ WARNING

- **Loads may slip or fall if the Wedge Socket is not properly installed.**
- **A falling load can seriously injure or kill.**
- **Load misapplied in direct contact with the wedge can dislodge the wedge and cause loss of load.**
- **Read and understand these instructions before installing the Wedge Socket.**
- **Do not side load the Wedge Socket.**
- **Apply recommended torque to tensioner and clip bolts, and properly install wire to securely lock tensioner bolt to tensioner.**
- **Do not assemble the S-423 Wedge in any brand or model socket basket other than the Crosby S-421T TERMINATOR.**
- **The size is marked on the socket basket and wedge, do not interchange wedge between sizes.**
- **The reuse of clips is discouraged. As recommended by Crosby, have qualified personnel inspect product before use.**



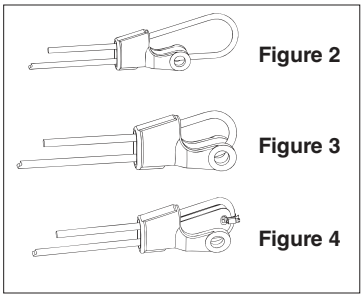
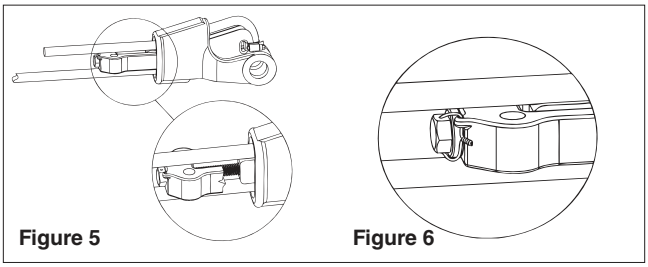
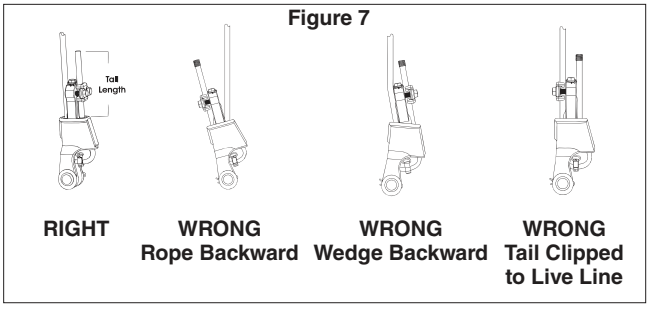


TABLE 1
S-423T Torque Value Table

Wedge Size (mm)	Tensioner Bolt Torque Nm*	Clip Bolts Torque Nm*
15.9	149	129
19.1	203	176
22.2	515	305
25.4	515	305
28.6	814	305
31.8	1220	488

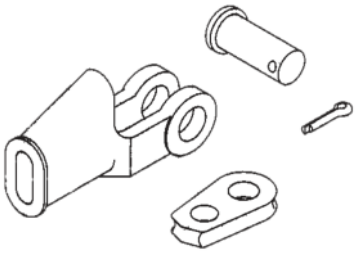
* The tightening torque values shown are based upon the threads being clean, dry, and free of lubrication.





WEDGE SOCKET

WARNINGS & APPLICATION INSTRUCTIONS



S-421 / US-422

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 modify or substitute parts.
- Repair minor nicks or gouges to socket or pin by lightly grinding until surface 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.
- Do not mix and match wedges or pins between models or sizes.
- Always select the wedge and socket for the wire rope size.

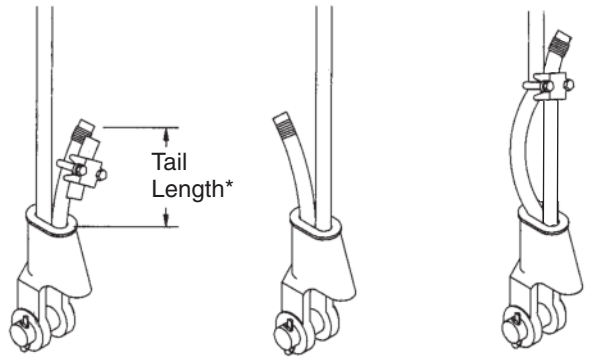
Assembly Safety

- 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 14 mm diameter wire rope use a 16 mm size Wedge Socket Assembly. Welding of the tail on standard wire rope is not recommended. Seizing of the tail is preferred following the recommended practices of the wire rope manufacturer. The tail length of the dead end should be a minimum of 6 rope diameters but not less than 150 mm.
- Align live end of rope, with center line of pin. (See Figure 1)
- Secure dead end section of rope. (See Figure 1)
- DO NOT ATTACH DEAD END TO LIVE END. (See Figure 1)
- Use a hammer to seat Wedge and Rope as deep into socket as possible before applying first load.
- 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 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 150mm. (Figure 1)

⚠ WARNING

- **Loads may slip or fall if the Wedge Socket is not properly installed.**
- **Load misapplied in direct contact with the wedge can dislodge the wedge and cause loss of load.**
- **A falling load can seriously injure or kill.**
- **Read and understand these instructions before installing the Wedge Socket.**
- **Do not side load the Wedge Socket.**
- **Do not interchange Crosby wedge socket, wedge or pin with non Crosby Wedge socket, wedge or pin.**
- **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.**
- **Do not interchange wedge between S-421 and US-422 or between sizes.**
- **The reuse of clips is discouraged. As recommended by Crosby, have qualified personnel inspect product before use.**

Figure 1



*Tail Length
Standard 6 to 8 strand wire rope
A minimum of 6 rope diameters, but not less than 150mm
(i.e. - For 25mm rope: Tail Length = 25mm x 6 = 150mm)

Rotation Resistant Wire Rope
A minimum of 20 rope diameters, but not less than 150mm
(i.e. - For 25mm rope: Tail Length = 25mm x 20 = 500mm)

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 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).
- Do not allow a direct load to contact the wedge.

WIRELOCK®

WARNINGS & APPLICATION INSTRUCTIONS

⚠ WARNING

- **WIRELOCK® should be stored in a cool dry place (10°C to 24°C/ 50°F to 75°F)**
- **Incorrect use of WIRELOCK® can result in an unsafe termination which may lead to serious injury, death, or property damage.**
- **Do not use WIRELOCK® with stainless steel rope in salt water environment applications.**
- **Use only soft annealed iron wire for seizing.**
- **Do not use any other wire (copper, brass, stainless, etc.) for seizing.**
- **Never use an assembly until the WIRELOCK® has gelled and cured.**
- **Remove any non-metallic coating from the broomed area.**
- **Non Crosby sockets with large grooves need to have those grooves filled before use with WIRELOCK®.**
- **Read, understand, and follow these instructions and those on product containers before using WIRELOCK®.**

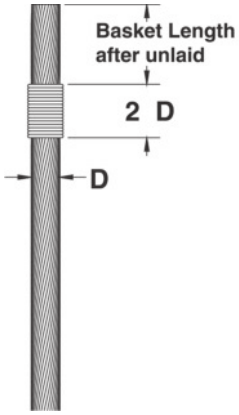
The following simplified, step-by-step instructions should be used only as a guide for experienced, trained users. ***For full information, consult the Wire Rope End Terminations Manual, API (American Petroleum Institute) Recommended Practice 9B, ISO Standards, Wire Rope Manufacturers Catalogs, and Wire Rope Sling Users Manual.***

STEP 1 – SOCKET SELECTION

1. **WIRELOCK®** is recommended for use with Crosby 416-417 Spelter Sockets. Structural strand requires a socket with the basket length approximately 5 times the strand diameter or fifty (50) times the wire diameter, whichever is greater, to achieve 100% efficiency. Consult The Wire Rope End Terminations Manual for proper selection of Wire Rope or Structural Strand sockets.
2. For use with sockets other than Crosby 416-417 consult the socket manufacturer or Crosby Engineering.
3. Sockets used with **WIRELOCK®** shall comply with Federal or International (CEN, ISO) Standards.
4. **WIRELOCK®**, as with all socketing media, depends upon the wedging action of the cone within the socket basket to develop full efficiency. A rough finish inside the socket may increase the load at which seating will occur. Seating is required to develop the wedging action.

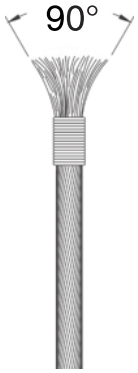
STEP 2 – MEASURE AND SEIZE

The rope ends to be socketed should be of sufficient length so that the end of the unlaid wires (from the strands) will be at the top of the socket basket. Seizing should be placed at a distance from the end equal to the length of the basket of the socket.



STEP 3 – BROOMING

1. Unlay the individual strands and fully broom out the wires of the wire rope and IWRC as far as the seizing. The wires should be separated but not straightened.
2. Cut out any fiber core.
3. Unlay the individual wires from each strand, including the IWRC, completely, down to the seizing.
4. Remove any plastic material from broomed area.

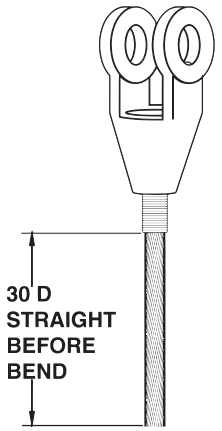


STEP 4 – CLEANING

1. The method of cleaning will depend on the lubriant and/or coating on the wire.
2. The methods and materials used for cleaning should comply with the current EPA or local regulations.
3. Consult your Wire Rope supplier or Wire Rope manufacturer for recommended material and methods. Follow the solvent supplier's recommendations for cleaning the broomed end.
4. Allow the broom to dry thoroughly.

STEP 5 – POSITIONING OF SOCKET

1. Position socket over the broom until it reaches the seizing on the wire rope. The wires should be LEVEL with the top of the socket basket.
2. Clamp rope and socket vertically ensuring alignment of their axes.
3. **CAUTION: DO NOT USE OVERSIZED SOCKETS FOR WIRE ROPE.**



STEP 6 – SEAL SOCKET

Seal the base of the socket with putty or plasticine to prevent leakage of the **WIRELOCK®**.

STEP 7 – WIRELOCK® KITS

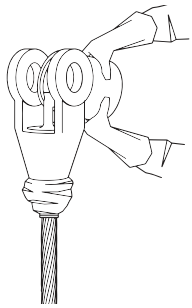
1. **WIRELOCK®** kits are pre-measured and consist of two (2) containers – one (1) with resin and one (1) with granular compound.
2. Use the complete kit – **NEVER MIX LESS THAN THE TOTAL CONTENTS OF BOTH CONTAINERS.**
3. Each kit has a shelf life clearly marked on each container and this must be observed. **NEVER USE OUT-OF-DATE KITS.**

⚠ CAUTION

- **WIRELOCK® resin, in liquid state, is flammable.**
- **Chemicals used in this product can give off toxic fumes and can burn eyes and skin.**
- **Never use out-of-date material.**
- **Use only in well-ventilated work areas.**
- **Never breathe fumes directly or for extended time.**
- **Always wear safety glasses to protect eyes.**
- **Always wear gloves to protect hands.**
- **Avoid direct contact with skin anywhere.**

STEP 8 – MIXING AND POURING

1. Mix and pour **WIRELOCK®** within the temperature range of 48° to 110° F. Booster kits are available for reduced temperatures.
2. Wirelock is set up to gel in 20 minutes at 65° F. For every 18° F rise in temperature the gel time willl halve. At 83° F the gel time will be 10 minutes and at 101° F it will be 5 minutes. To give extra working time of pot life it is worth considering refrigerating the kits for two hours prior to mixing and pouring. The socket should also be as cool as possible - out of direct sunlight, as an example.
3. Pour all the resin into a container containing all the granular compound and mix thoroughly for two (2) minutes with a flat paddle.
4. The **WIRELOCK®** will turn a green blue color. If it does not turn a green blue after mixing, DO NOT USE.
5. Immediately after mixing, slowly pour the mixture down one side of the socket until the socket basket is full.
6. Check for leakage at nose of socket, add putty if required.



STEP 9 – CURING

1. **WIRELOCK®** will gel in approximately 20 minutes, in a temperature range 65° F (18° C) to 75° F (24° C).
2. The socket must remain undisturbed in the vertical position for an additional ten (10) minutes after gel is complete.
3. The socket will be ready for service 60 minutes after gelling.
4. Never heat sockets to accelerate gel or curing.

STEP 10 – RE-LUBRICATION

Re-lubricate wire rope as required.

STEP 11 – PROOF LOADING

Whenever possible, the assembly should be proof loaded. In accordance with ASME B30.9.

ALTERNATE SEIZING AND BROOMING METHOD

Reference the ***Wire Rope End Terminations User's Manual*** from Crosby for an alternative socketing method.

NATIONAL DIE INFORMATION

⚠ CAUTION

- **Improper die selection could result in significant loss of efficiency in the termination.**

National dies and die holders are made solely for swaging properly designed fittings on wire rope, and any other uses are prohibited.

The swaging operation results in a high degree of cold metal flow. The movement that occurs between the fitting and the dies will cause wear of the dies. Therefore, to prolong the life of the dies, it is important to always lubricate die faces and cavities between each pass with a light weight oil or high pressure grease.

When scores appear in the die cavities, the dies should be removed from service.

NEVER EXCEED THE WORKING LOAD LIMIT OF DIES OR DIE HOLDERS.

All National Standard dies 1/4" through 1" include an open channel die cavity and a tapered die cavity in the same die block.

Dies for S-505 Standard Steel Sleeves (Flemish Eyes)

Die sizes for 1/4" through 1"

Swaging 1/4" through 1" Standard Steel S-505 sleeves on Flemish Eye terminations requires the use of the taper cavity only. Refer to page 24 of the *Wire Rope End Termination User's Manual* for proper die selection.

Die sizes for 1-1/8" and above

Swaging 1-1/8" and larger Standard Steel S-505 sleeves on Flemish Eye terminations requires using 2 sets of open channel dies (1st stage and 2nd stage) for each size. Beginning with the 1st stage die and finishing with the 2nd stage die will achieve proper after swage dimensions. Dies for S-505 Sleeves 1-1/8" and larger are single cavity with open channel. Refer to page 24 of the *Wire Rope End Termination User's Manual* for proper die selection.

Using S-505 Sleeves with Metric Ropes

Although Crosby National S-505 Standard Steel sleeves are designed to be used with most metric ropes, there are selected "intermediate" sizes of metric ropes that when swaged in standard National dies utilizing Crosby National S-505 sleeves do not achieve required after swage dimensions and efficiencies. To ensure all 505 sleeves achieve the required efficiency when used with metric ropes, Crosby provides special National swaging dies to be used in conjunction with selected size metric ropes. These new dies will produce the required efficiencies and after swage dimensions.

The table found on pge 46 of this catalog or page 25 of the *Wire Rope End Termination User's Manual* identifies the new dies that are required to properly swage the selected intermediate size wire ropes not covered in the standard product offering found on page 45 of this catalog or page 24 of the manual.

Dies for 6mm through 26mm (except 12mm, 20mm and 24mm)

Swaging on 6mm through 26mm metric ropes for Flemish Eye slings requires the selection of the proper S-505 Standard Steel sleeve and the use of the tapered cavity only. Refer to page 24 of the *Wire Rope End Termination User's Manual* for proper sleeve and die selection.

Dies for 12mm, 20mm and 24mm

Swaging on 12mm, 20mm and 24mm metric ropes for Flemish Eye slings requires the selection of the proper S-505 Standard Steel sleeve and the use of both the open cavity and tapered cavity in special dies. Refer to page 25 of the *Wire Rope End Termination User's Manual* for proper sleeve and die selection.

Dies for 28mm and larger

Swaging on 28mm and larger metric ropes for Flemish Eye slings requires the selection of the proper S-505 Standard Steel sleeve and the use of 2 sets of open channel dies (1st stage and 2nd stage) for each size. Beginning with the 1st stage die and finishing with the 2nd stage die will achieve proper after swage dimensions. Dies for S-505 sleeves 28mm and larger are single cavity with open channel. Refer to page 24 of the *Wire Rope End Termination User's Manual* for proper sleeve and die selection.

Important: If the specific size metric rope required is not listed on page 24 of the *Wire Rope End Termination User's Manual* refer to Intermediate Metric Die Chart on page 25 of the manual for proper sleeve and die selection.

Dies for QUIC-PASS® Swaging System – 1/4" through 1-1/2"

The *QUIC-PASS*® swaging system allows "Flemish style" wire rope terminations to be swaged in only two passes. This is accomplished while maintaining currently published efficiency ratings and utilizing National Swage S-505 Standard "COLD TUFF"® Steel Sleeves.

The special design of the *QUIC-PASS*® dies allows the swaging process to be completed in just two passes, resulting in a 50-75% reduction in the number of passes required with conventional swaging systems. Unlike standard round dies, the *QUIC-PASS*® dies close completely with each pass, resulting in an increase in overall swaging process efficiencies (the job can be performed quicker), a reduction in the complexity of swaging (the concern for excess flashing between dies has been eliminated) and a reduction in training time needed for operators (more user friendly).

The finished sleeve has a "Hex" appearance that provides a *QUIC-CHECK*® look to determine if the termination has been swaged and provides a flat surface that allows for ease of I.D. stamping on the finished sleeve. Refer to page 24 of the *Wire Rope End Termination User's Manual* for proper die selection.

Dies for S-501 & S-502 Swage Sockets

Swaging all S-501 & S-502 Swage Sockets requires the use of single cavity die. This is a special die designed with a relief for swage sockets and extra length to swage the full length of the shank. Refer to pages 36 and 37 of the *Wire Rope End Termination User's Manual* for proper die selection.

Swage Sockets for Spiral Strand Rope
Our tests indicate that if the spiral strand is 1 x 19 or greater, and the ultimate strength does not exceed Table 1 of ASTM A586, you can use dies for size swage sockets up to the 1-1/4". For sizes greater than 1-1/4" the following will apply:

1. Closed S-502 Sockets: One (1) socket size larger with shank modified for actual strand diameter 1-3/8" through 2".
2. Open S-501 Sockets: One (1) socket size larger with shank modified for actual strand diameter 1-3/8" through 2".
3. If the strand is of greater strength than Table 1 of ASTM A586 or has less metallic area, we must recalculate the design and test for adequacy.

Dies for S-506 Turnback Sleeves

Turnback eye terminations using 5/16" through 1" S-506 Sleeves utilize the S-505 Standard Steel Sleeve die (1st Stage open channel die only). The 1-1/4" S-506 Sleeve utilizes the 1-3/8" socket (S-501 and S-502) die. Refer to page 46 of the *Wire Rope End Termination User's Manual* for proper die selection.

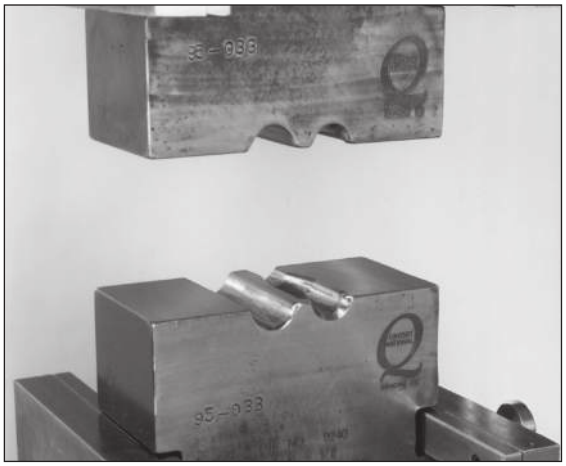
Dies for S-409 Buttons

Buttons are swaged in open channel dies. Refer to page 42 of the *Wire Rope End Termination User's Manual* or on page 47 of this catalog for proper die selection.

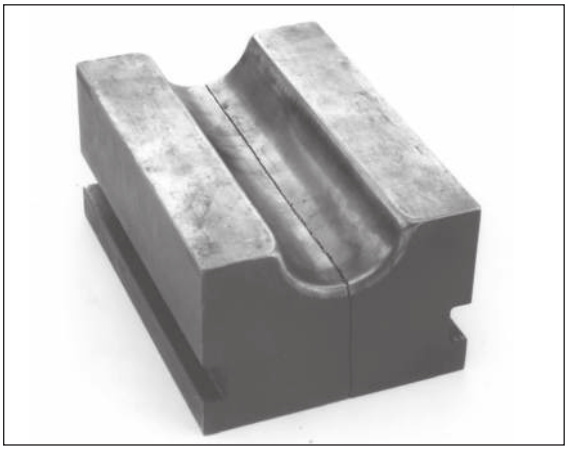
Specific recommended swaging practices can be found in each product section of this catalog. The proper die selection and the recommended maximum after swage dimensions are referenced in the section of this catalog that contains the product you are swaging. This information can also be found in the National Swage Die Guide, or by referring to the National Swage Die Chart.

Dies and die adapters to fit other type swaging machines are available upon request (Refer to page 19 of the *Wire Rope End Termination User's Manual*).

Single Cavity Die



Two Cavity Die



Never use dies that are cracked, worn or abraided (galled).

After Swage Inspection Procedures

⚠ WARNING

- **Read, understand, and follow these instructions before using the National QUIC-PASS® Swaging System.**
- **Improper after swage dimensions can result in sling failure resulting in property damage, serious injury or death.**
- **Always gauge or measure the after swage dimensions to ensure proper sling performance.**
- **Using National Swaging System with ropes and termination styles other than shown in these procedures may reduce the performance of the termination and lead to premature failure.**
- **When using rope constructions other than shown in this procedure, the termination must be destructive tested and documented to prove adequacy of the assembly to be manufactured.**
- **The QUIC-PASS® Swaging System is designed only for "Flemish Eye" terminations using National S-505 Standard Steel Sleeves.**
- **The QUIC-PASS® Swaging System is not designed for Cable-Laid wire rope slings.**

Checking Swaging Dimensions

One of the important considerations in producing a quality termination is the overall diameter of the fitting after the swaging process is complete. Since all dies wear, and the swaged fitting used in terminations has spring back, the results of swaging should be checked periodically to determine the wear condition of the die as well as to ensure the fitting is swaged to proper dimensions.

Key Facts About After Swage Dimensions:

1. In addition to worn dies, not achieving the proper after swage dimension can also be due to the die not being fully closed during swaging. Dies showing excessive wear should be replaced.
2. The effective swaging that dies can accomplish stops when the die lands touch each other. Any continued swaging adds needless wear and strain on the dies and swaging machine.
3. By placing a light oil on the die faces and in the cavity, the dies will be lubricated as well as protected.
4. The oozing of the oil from the faces of the dies as they touch will indicate when the dies have closed. At this point, stop the swaging cycle.
5. Additional swaging adds needless wear and strain to the dies and swaging machine.
6. Never use dies that are cracked, worn or abraded (galled).
7. The Crosby Group does not recommend the checking of die dimensions as an acceptable method of determining the quality of a swage sleeve, button, ferrule, or socket.
8. It is our recommendation that the checking of the after swage dimension of the swaged fitting is the most accurate indicator of a properly swaged termination. Measuring the die cavity only is not an acceptable process control check.
9. If the die cavity wears, the dies are not closed completely during swaging. If an inadequate number of presses are used, it could be quickly identified by checking the after swage dimension of the part.
10. Swaging Machine not producing sufficient tonnage will affect after swage dimensions.

No-Go Gauge Information

To assist in checking the after swage dimensions of the fitting, the Crosby Group provides the National No-Go Gauges. When used correctly the National No-Go Gauges can determine if the fittings were swaged to the proper diameter. We would recommend that all Crosby products or product swaged in Crosby dies be checked with the proper gauge to determine the acceptability of the swaging process.

- Gauges are made of hardened alloy steel and machined to strict tolerances.
- Gauge can be used to verify that all fittings have been swaged properly.
- After swage dimensions not within the maximum limits may result from worn dies or improper swaging techniques.
- Other type gauges are available upon request.
- National No-Go Gauges are available for a variety of products (See Table 1).
- **No-Go Gauges and QUIC-PASS® No-Go Gauges are not interchangeable.**

Table 1 - Standard Round No-Go Gauges

Fitting	Size	Part No.
505 Sleeve	1/4 - 7/8	1095512
505 Sleeve	1 - 1-1/2	1095521
505 Sleeve	1-3/4	1095530
505 Sleeve	2	1095549
505 Sleeve	2-1/4	1095558
505 Sleeve	2-1/2	1095567
505 Sleeve	2-3/4	1095576
505 Sleeve	3	1095585
505 Sleeve	3-1/2	1095594
505 Sleeve	3-3/4	1095601
505 Sleeve	4	1095610
501/502 Socket	1/4 - 1	1095647
501/502 Socket	1-1/8 - 1-3/4	1095656
501/502 Socket	2	1095665

Using No-Go Gauges

When swaged properly, the gauge will go up and down (see Figure 1) and around the full length of the fitting (see Figure 2).

For the proper after swage dimensions, see the section in this publication for the specific product you are swaging.

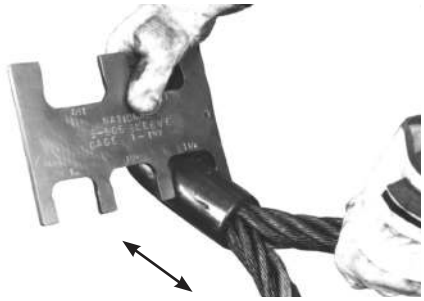


Figure 1

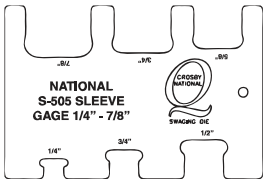
Figure 2

QUIC-PASS® No-Go Gauges

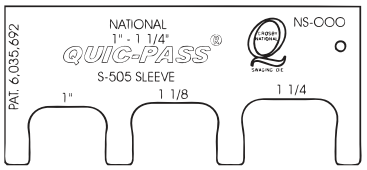
As a further aid, QUIC-PASS® No-Go gauges are available for checking the sleeve's dimensions after swaging is complete.

- Gauges are made of hardened alloy steel and machined to strict tolerances.
- Gauge can be used to verify that all sleeves have been swaged properly.
- "After Swage" dimensions not within the maximum limits may result from worn dies or improper swaging techniques.
- **No-Go Gauges and QUIC-PASS® No-Go Gauges are not interchangeable.**

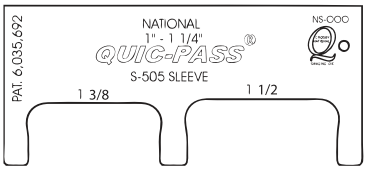
QUIC-PASS® No-Go Gauges	
Sleeve and Size	**Stock No.**
No-Go Gauge for S-505 1/4" - 7/8"	1923705
No-Go Gauge for S-505 1" - 1-1/4"	1923712
No-Go Gauge for S-505 1-3/8" - 1-1/2"	1923714



Stock No. 1923705

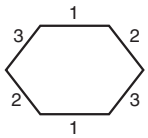


Stock No. 1923712



Stock No. 1923714

Use a National QUIC-PASS® No-Go Gauge to check the after swage dimensions to ensure that it has been swaged to the proper dimension. When swaged properly, the gauge will slide up and down the full length of the sleeve on all three sets of opposing flats.



QUIC-PASS® Maximum After Swage Dimensions

Size (in)	Maximum "After Swage" Dimension (in)
1/4	0.565
5/16 - 3/8	0.769
7/16 - 1/2	1.016
9/16 - 5/8	1.247
3/4	1.475
7/8	1.738
1	1.955
1-1/8	2.170
1-1/4	2.405
1-3/8	2.610
1-1/2	2.835

Important Safety Information

- **Crosby does not recommend** a "Texas Tuck" style termination with Crosby National S-505 "COLD TUFF®" Standard Steel Sleeves.
- Only Crosby National S-505 "COLD TUFF®" Standard Steel Sleeves are recommended when using the QUIC-PASS® Swaging System.
- National S-505 Standard Steel Sleeves, when used with the QUIC-PASS® Swaging System, are only recommended for use with one (1) part 6 X 19 or 6 X 37, IPS or XIP (EIP), XXIP (EEIP), RRL, IWRC rope.
- The condition of the swaging machine can cause sleeve "After Swage" size not to be within the proper dimensions. Example: worn bushings, loose tie rods, loose die holders, misaligned platens, worn pins, worn linkage, etc.
- Swaging dies being worn, damaged, misused, or undersized can cause sleeve "After Swage" size not to be within the proper dimension.
- Swaging die holders excessively worn, damaged, misused or loose can cause sleeve "After Swage" size not to be within the proper dimension. Only use QUIC-PASS® dies and die holders inspected and properly secured in National swaging machines.
- Always refer to Warning and Application information found in this catalog and *Wire Rope End Terminations User's Manual.*

CROSBY® THIMBLE EYE BUNDLE CLIPS

WARNING & APPLICATION INSTRUCTIONS

G-461

The Bundle Clip is utilized in a choker hitch application to maintain the shape of bundled packages after a load is placed. The Bundle Clip is attached to live line of choker hitch, but it is never to be used as a button or ferrule to carry a load in the primary load path.

Certain conditions (such as extreme variation of the choke size) or improper installation may cause the eye of the choke hitch to disengage from the Bundle Clip and allow the eye to seat away from or below the Bundle Clip (see Figure 3). If this occurs, the Bundle Clip must be removed and installed in the proper position.

The Bundle Clip is sized to provide a grip to the live rope without reducing the efficiency of a choker hitch. This grip is adequate to keep the bundle clip in position.

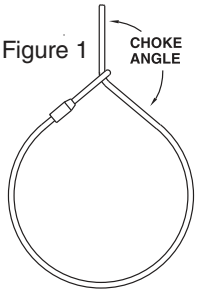
These instructions are for use with thimble eyes formed with RRL or RLL wire rope, 6 x 19 or 6 x 36 Class, FC or IWRC; IPS or XIP, XXIP, and a Crosby Thimble. For other classes of wire rope not mentioned above, we recommend contacting Crosby Engineering.

For Soft Eye applications see the Crosby G-460 Soft Eye Bundle Clip.

For OSHA (Construction) applications, see OSHA 1926.251.

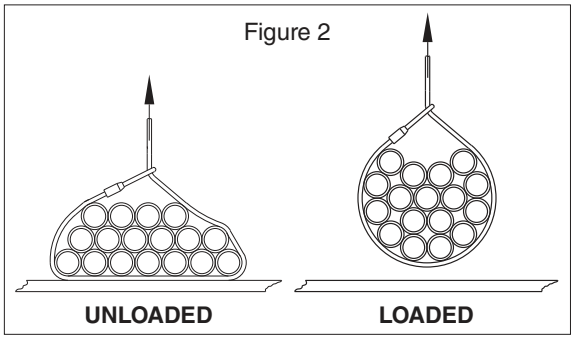
1. The eye of the sling must be in the choked position (around live line). Choker hitch applications should comply with the requirements of ASME B30.9 Slings. Install the choker hitch to provide a minimum choke angle of 120 degrees (See Figure 1). Refer to ASME B30.9 for required de-rating of the sling if choke angle is less than 120 degrees.

Figure 1



2. Before installing Bundle Clip, apply initial load by lifting the bundle and clearing the support, producing a tight choke. Repeat as necessary until the bundle package is in the most compact position (See figure 2, Loaded). **Keep hands and feet from under load.**

Figure 2



⚠ WARNING

- **Failure to read, understand, and follow these instructions may cause death or serious injury.**
- **A falling load may seriously injure or kill.**
- **Read and understand these instructions before using clips.**
- **Failure to properly position the Bundle Clip may allow the load to slip and fall.**
- **Match the same size clip to the same size wire rope.**
- **Install Bundle Clip only as instructed.**
- **Do not use with plastic coated wire rope.**
- **Do not use for lifting personnel.**

3. After initial loading, install the Bundle Clip. The orientation of the Bundle Clip on the live line is not an important consideration, as the assembly is of adequate size to prevent passage through proper size Crosby Thimble and next larger size Thimble. Insert U-bolt through the Bundle Clip. Properly position the clip base over the U-bolt and install nuts (See Figure 3). Use torque wrench to tighten evenly, alternating from one nut to the other until the bundle stop bottoms out on the clip base, and the recommended torque is reached (See Table 1).

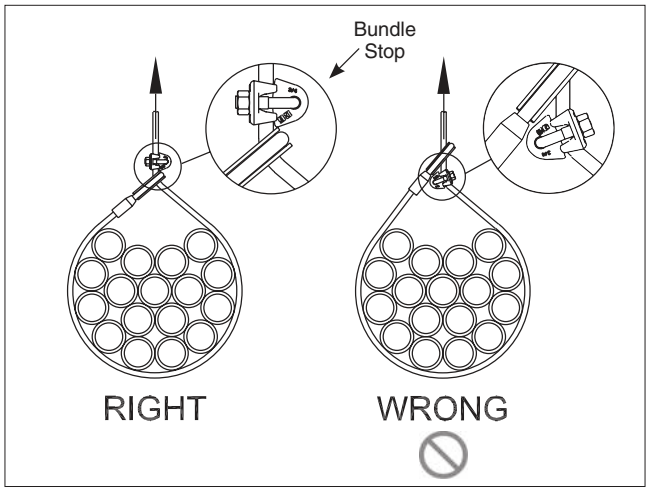


Figure 3

Table 1 – Recommended Torque

Clip Size	Rope Size (mm)	Torque (Nm)
5/8	16	129
3/4	19	176
7/8	22	305

4. Before each lift, check to ensure that the choke eye has not slipped from the Bundle Clip. Repeat Step 3 if necessary.
5. When disconnecting, the load should be clear of the stable support (See figure 2, Loaded). Remove Bundle Clip. Stay clear of the load as the bundle is lowered and the load is removed from the sling.

In accordance with good rigging and maintenance, the wire rope sling should be inspected periodically for wear, abuse, and general adequacy.

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CROSBY® SOFT EYE BUNDLE CLIPS

WARNING & APPLICATION INSTRUCTIONS

G-460

The Bundle Clip is utilized in a choker hitch application to maintain the shape of bundled packages after a load is placed. The Bundle Clip is attached to live line of choker hitch, but it is never to be used as a button or ferrule to carry a load in the primary load path.

Certain conditions (such as extreme variation of the choke size) or improper installation may cause the eye of the choke hitch to disengage from the Bundle Clip and allow the eye to seat away from or below the Bundle Clip (see Figure 3). If this occurs, the Bundle Clip must be removed and installed in the proper position.

The Bundle Clip is sized to provide a grip to the live rope without reducing the efficiency of a choker hitch. This grip is adequate to keep the bundle clip in position. The eye may pull free of the Bundle Clip if not positioned properly.

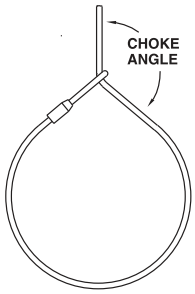
These instructions are for use with soft eyes (no thimble) formed with RRL or RLL wire rope, 6 x 19 or 6 x 36 Class, FC or IWRC; IPS or XIP, XXIP. For other classes of wire rope not mentioned above, we recommend contacting Crosby Engineering.

For Thimble Eye applications see the Crosby G-461 Thimble Eye Bundle Clip.

For OSHA (Construction) applications, see OSHA 1926.251.

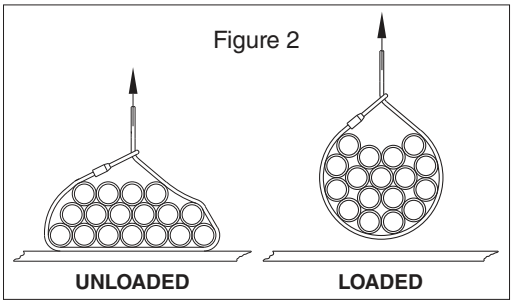
1. The eye of the sling must be in the choked position (around live line). Choker hitch applications should comply with the requirements of ASME B30.9 Slings. Install the choker hitch to provide a minimum choke angle of 120 degrees (See Figure 1). Refer to ASME B30.9 for required de-rating of the sling if choke angle is less than 120 degrees.

Figure 1



2. Before installing Bundle Clip, apply initial load by lifting the bundle and clearing the support, producing a tight choke. Repeat as necessary until the bundle package is in the most compact position (See figure 2, Loaded). **Keep hands and feet from under load.**

Figure 2



⚠ WARNING

- **Failure to read, understand, and follow these instructions may cause death or serious injury.**
- **A falling load may seriously injure or kill.**
- **Read and understand these instructions before using clips.**
- **Failure to properly position the Bundle Clip may allow the load to slip and fall.**
- **Do not use the Bundle Clip to form the choke hitch (See Figure 3).**
- **Match the same size clip to the same size wire rope.**
- **Install Bundle Clip only as instructed.**
- **Do not use with plastic coated wire rope.**
- **Do not use for lifting personnel.**

3. After initial loading, install the Bundle Clip in proper orientation, with curved portion (Bundle Clip tip) over the eye of the sling. Insert U-bolt through the Bundle Clip. Properly position the clip base over the U-bolt and install nuts (See Figure 3). Use torque wrench to tighten evenly, alternating from one nut to the other until the curved portion bottoms out on the clip base, and the recommended torque is reached (See Table 1).

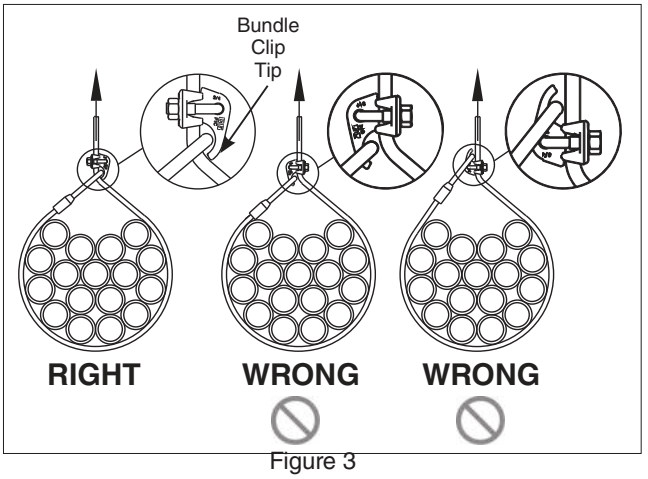


Figure 3

Table 1 – Recommended Torque

Clip Size	Rope Size (mm)	Torque (Nm)
5/8	16	129
3/4	19	176
7/8	22	305

4. Before each lift, check to ensure that the choke eye has not slipped from the Bundle Clip tip. Repeat Step 3 if necessary.
5. When disconnecting, the load should be clear of the stable support (See figure 2, Loaded). Remove Bundle Clip. Stay clear of the load as the bundle is lowered and the load is removed from the sling.

In accordance with good rigging and maintenance, the wire rope sling should be inspected periodically for wear, abuse, and general adequacy.

Crosby® ROV HOOKS

WARNINGS & APPLICATION INSTRUCTIONS

QUIC-CHECK® Hoist hooks incorporate markings forged into the product which address two (2) **QUIC-CHECK®** features:

QUIC-CHECK®

Deformation Indicators – Two strategically placed marks, one just below the shank or eye and the other on the hook tip, which allows 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 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.

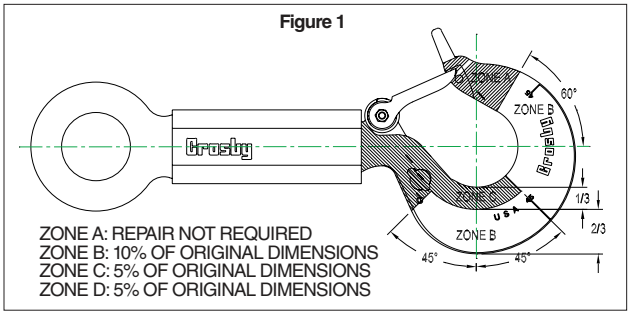
IMPORTANT SAFETY INFORMATION - READ & FOLLOW

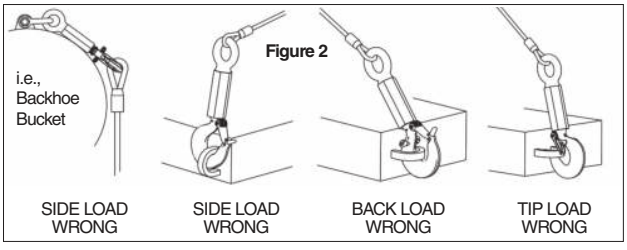
- A visual periodic inspection for cracks, nicks, wear, gouges and deformation as part of a comprehensive documented inspection program, should be conducted by trained personnel in compliance with the schedule in ASME B30.10 and/or regulations governing your industry or jurisdiction.
- For ROV hooks used in frequent load cycles or pulsating loads, the ROV hook components (hoist hook, eye bolt and hexagon body) and their threads should be periodically inspected by Magnetic Particle or Dye Penetrant (Disassembly will be required).
- Disassemble the eye bolt and shank hook from hexagon body (sizes up to and including 31.5t WLL). This requires removing the 2 spiral pins and unscrewing the eye bolt and hoist hook.
- Always use new spiral pins when re-assembling the ROV Hook.
- After reassembly, Crosby recommends a proof test equal to 2 times the ROV hook's stated WLL.
- Never use a hoist 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 hoist hook that is worn beyond the limits shown in Figure 1.
- Remove from service any hoist hook with a crack, nick or gouge. Hoist hooks with a 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. Contact Crosby Engineering to evaluate any cracks.
- Never repair, alter, rework, or reshape an ROV hook by welding, heating, burning, or bending.
- Remove from service a hoist hook or eye bolt which has threads corroded more than 20% of the hexagon body engagement length.
- Never side load, back load, or tip load the hoist hook, eye bolt or hexagon body. (Side loading, back loading and tip loading are conditions that damage and reduce the capacity of the ROV hook). (See Figure 2.)
- The use of a latch may be mandatory by regulations or safety codes. Follow the regulations governing your industry or jurisdiction.

⚠ WARNING

- **Loads may disengage from hook if proper procedures are not followed.**
- **A falling load may cause serious injury or death.**
- **Hook must always support the load. The load must never be supported by the latch.**
- **Read and understand these instructions before using hook and latch.**

Figure 1





- Always make sure the hook supports the load. The latch must never support the load.
- 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 ANSI/ASME B30.10 "Hooks" for additional information.
- Remove from service any eye bolt with a crack, nick or gouge. Eye bolt with a nick or gouge shall be repaired by grinding lengthwise, following the contour of the eye bolt, provided that the reduced dimension is no greater than 5% of original dimension. Contact Crosby Engineering to evaluate any cracks.

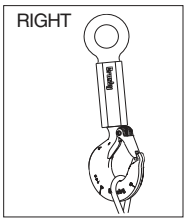


Figure 3

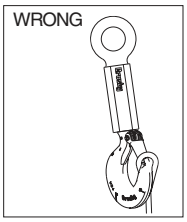


Figure 4

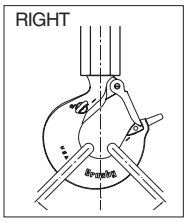


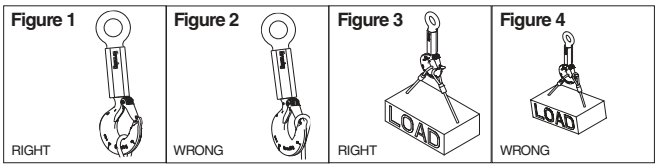
Figure 5

- Never use an eye bolt if eye or shank is bent or elongated.
- Remove from service the hexagon body if internal threads are corroded beyond 20% of the eye bolt or hoist hook shank's threaded engagement lengths.
- Hexagon body with nicks or gouges may be repaired by grinding lengthwise.
- Inspect the spiral pin holes on the hoist hook, hexagon body and eye bolt. At assembly, the spiral pin must engage with a press fit.

Warning and Application Instructions for Crosby® Hook Latch

Important Safety Information – Read & Follow

- Always inspect hook and latch before using.
- Never use a latch that is distorted or bent.
- Always make sure spring will force the latch against the tip of the hook.
- Always make sure hook supports the load. The latch must never support the load. (See Figures 1 & 2)
- When placing two (2) sling legs in hooks, make sure the angle between the legs is less the 90° and if the hook or load is tilted, nothing bears against the bottom of this latch. (See Figures 3 & 4)
- Latches are intended to retain loose sling or devices under slack conditions.
- Latches are not intended to be an anti-fouling device.

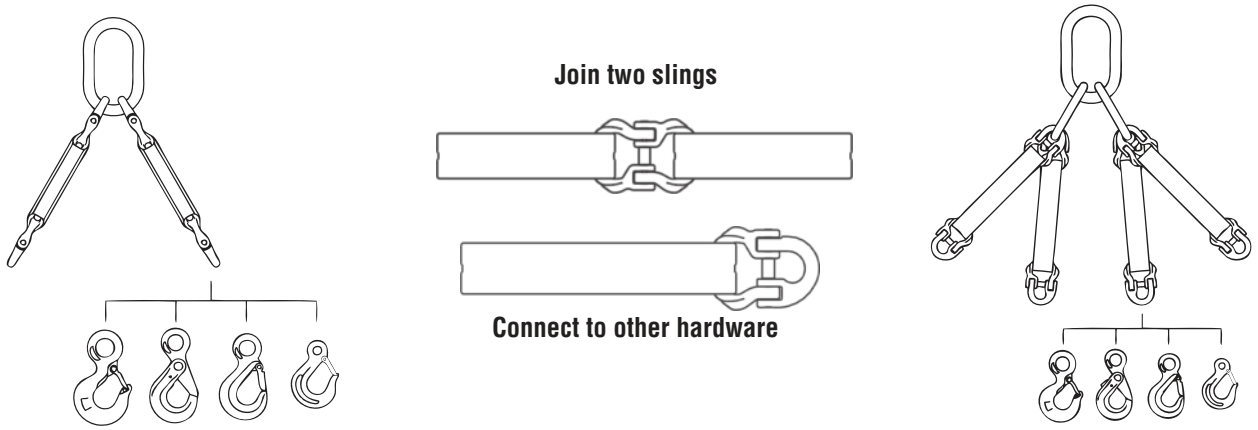


⚠ WARNING

- **Loads may disengage from hook if proper procedures are not followed.**
- **A falling load may cause serious injury or death.**
- **See OSHA Rule 1926.550 (g)(4)(iv)(B) for personnel hoisting for cranes and derricks. Only a Crosby or McKissick hook with a PL Latch attached and secured with bolt, nut and cotter (or Crosby Toggle Pin) or a Crosby hook with a S-4320 Latch attached and secured with a cotter pin, or a Crosby SHUR-LOC® hook in the locked position may be used for any personnel hoisting. A hook with a Crosby SS-4055 latch attached shall NOT be used for personnel lifting.**
- **Hook must always support the load. The load must never be supported by the latch.**
- **Read and understand these instructions before using hook and latch.**

Typical Application

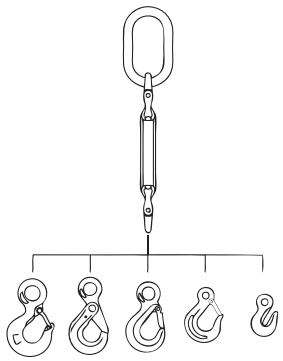
The S-237 and S-238 connectors have been designed to easily adapt to other Crosby fittings to develop complete systems for high performance Synthetic Slings.



These easy-to-use charts are designed to allow you to quickly determine the Crosby Fitting required for your high performance sling.

Single Leg Sling

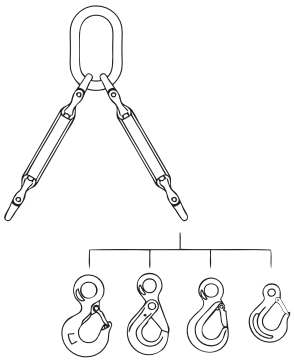
S-237 Frame	Working Load Limit 4:1 (kg)*	Working Load Limit 5:1 (kg)*	A-1337 Lok-A-Loy (mm)	A-342 (mm)	A-344 (mm)	L-320A L-320AN† (t)	L-320A L-320AN† Frame	S-1316 (mm)	S-315A (mm)	L-1327 (mm)
5	2834	2268	10	25	22	†7	JA	16	16	16
10	5670	4536	16	25	22	†7	JA	16	16	16
15	8505	6804	20	32	25	†11	KA	19	–	19
25	14175	11340	22	38	32	†15	LA	22	–	22
30	17010	13607	22	38	32	†15	LA	22	–	22
40	22680	18145	25	44	–	†22	NA	25	–	–
60	34020	27215	32	51	–	30	OA	–	–	–



* Ultimate load is 5 times the Working Load Limit. † L-320AN Style Hook.

Double Leg Sling

S-237 Frame	Working Load Limit 4:1 (kg)*	Working Load Limit 5:1 (kg)*	A-1337 Lok-A-Loy (mm)	A-342 (mm)	A-344 (mm)	L-320A L-320AN† (t)	L-320A L-320AN† Frame	S-1316 (mm)	S-315A (mm)	L-1327 (mm)
5	2834	2268	10	32	32	†7	JA	16	16	16
10	5670	4536	16	32	32	†7	JA	16	16	16
15	8505	6804	20	38	–	†11	KA	19	–	19
25	14175	11340	22	44	–	†15	LA	22	–	22
30	17010	13607	22	44	–	†15	LA	22	–	22
40	22680	18145	25	51	–	†22	NA	25	–	–
60	34020	27215	32	57	–	30	OA	–	–	–



* Ultimate load is 5 times the Working Load Limit. † L-320AN Style Hook.

For Triple and Quad leg slings, contact Crosby Engineering at (918) 834-4611

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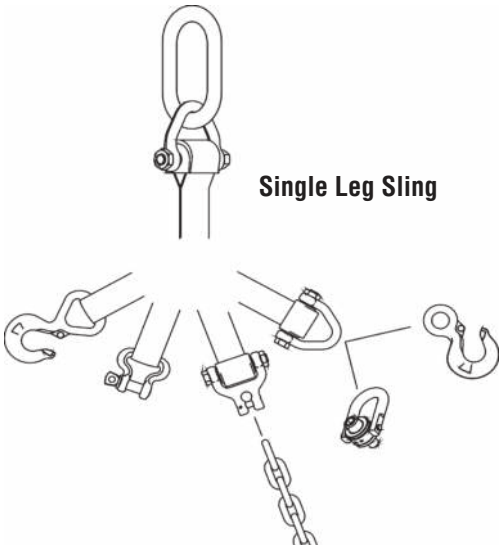
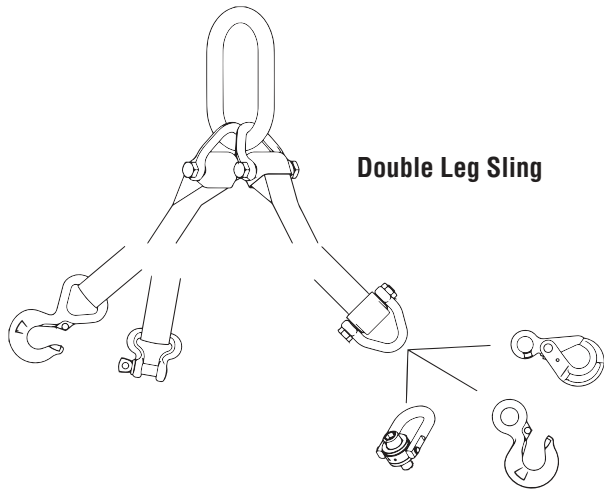




These easy-to-use charts are designed to allow you to quickly determine the fitting required to create the Web Sling or Round Sling you need.

Single and Double Leg Slings Component Recommendations based on Type III, (Eye & Eye), Class 7, 2 Ply web slings.

S-280 Web Connector S-281 Web Sling Shackle							S-280 Web Connector				
Web Sling											
Round Sling Size (No.)	Web Width (mm)	Eye Width (mm)	Ply.	S-280 S-281 Working Load Limit (t)	Web Sling Hook WSL-320 (t)	Spectrum 8® Chain Size (in) – (mm)	Eye Hoist Hook L-320AN (t)	Eye SHUR-LOC® S-1316 (mm)	Swivel Hoist Ring HR-125 (kg)	Master Link A-342 Single Leg (mm)	Master Link A-342 Double Leg (mm)
1 & 2	50	50	2	2.95	3	3/8 - 10	3.2	13	3000	16	19
3	75	35	2	4.08	5	1/2 - 13	5.4	16	4200	19	25
4	100	50	2	5.67	—	5/8 - 16	8	16	7000	25	25
5 & 6	150	75	2	7.70	—	—	11.5	—	11000	25	32

Triple and Quad Leg Slings Component Recommendations based on Type III, (Eye & Eye), Class 7, 2 Ply web slings.

S-280 Web Connector S-281 Web Sling Shackle							S-280 Web Connector				
Web Sling											
Round Sling Size (No.)	Web Width (mm)	Eye Width (mm)	Ply.	S-280 S-281 Working Load Limit (t)	Web Sling Hook WSL-320 (t)	Spectrum 8® Chain Size (in) – (mm)	Eye Hoist Hook L-320AN (t)	Eye SHUR-LOC® S-1316 (mm)	Swivel Hoist Ring HR-125 (kg)	Master Link A-342 Triple Leg (mm)	Master Link A-342 Quad Leg (mm)
1 & 2	50	50	2	2.95	3	3/8 - 10	3.2	13	3000	25	25
3	75	35	2	4.08	5	1/2 - 13	5.4	16	4200	25	32
4	100	50	2	5.67	—	5/8 - 16	8	16	7000	32	38
5 & 6	150	75	2	7.70	—	—	11.5	—	11000	38	44

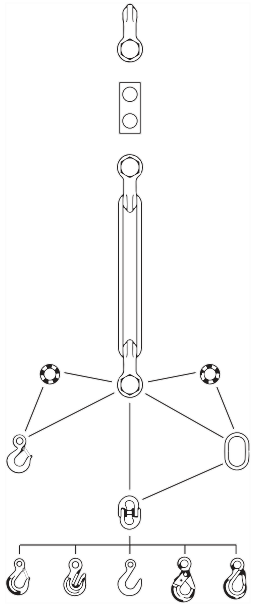
Easily Integrated into Synthetic Sling System

The Synthetic Sling Saver shackles line has been designed to easily adapt Crosby Sling fittings in the development of complete systems for synthetic slings.

Single Leg Slings

Sling Saver Shackle							LOK-A-LOY® Link* A-1337				
Web Sling Eye Width (mm)	Working Load Limit (t)	Sling Saver Shackle Spool S-255 (mm)	Sling Saver Shackle Link Plate S-256 (mm)	Eye Hoist Hook L-320AN† L-320A (t)	Alloy Master Link A-342 (mm)	Master Link Assy. A-345 (mm)	Sling Hook L-1327 (mm)	Eye Grab Hook A-1328 (mm)	Eye Foundry Hook A-1329 (mm)	Eye SHUR-LOC® S-1316A (mm)	Eye Latching S-315A (mm)
25	3-1/4	25	25	†5.4	19	—	10	10	10	10	10
35	6-1/2	35	35	†8	25	—	16	16	16	16	16
50	8-3/4	50	50	†11.5	25	—	16	16	16	16	16
75	12-1/2	75	75	†16	32	—	19	19	19	—	19
100	20-1/2	100	100	†22	44	—	—	19	—	19	—
125	35	125	125	37	51	—	—	19	—	—	—
150	50	150	150	60	57	—	—	19	—	—	—

* LOK-A-LOY® size same as hook size. † New 320N Eye Hook.

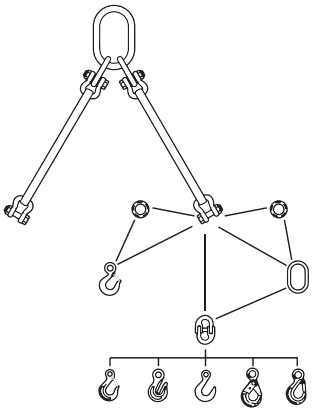


Single Leg Sling

Double Leg Slings

Sling Saver Shackle							LOK-A-LOY® Link* A-1337				
Web Sling Eye Width (mm)	Working Load Limit (t)	Sling Saver Shackle Spool S-255 (mm)	Sling Saver Shackle Link Plate S-256 (mm)	Eye Hoist Hook L-320AN† L-320A (t)	Alloy Master Link A-342 (mm)	Master Link Assy. A-345 (mm)	Sling Hook L-1327 (mm)	Eye Grab Hook A-1328 (mm)	Eye Foundry Hook A-1329 (mm)	Eye SHUR-LOC® S-1316A (mm)	Eye Latching S-315A (mm)
25	3-1/4	25	25	†5.4	19	25	10	10	10	10	10
35	6-1/2	35	35	†8	25	32	16	16	16	16	16
50	8-3/4	50	50	†11.5	25	32	16	16	16	16	16
75	12-1/2	75	75	†16	32	38	19	19	19	—	19
100	20-1/2	100	100	†22	44	44	—	—	—	—	—
125	35	125	125	37	51	—	—	—	—	—	—
150	50	150	150	60	57	—	—	—	—	—	—

* LOK-A-LOY size same as hook size. † New 320N Eye Hook.



Double Leg Sling

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Sling Saver Inspection Information

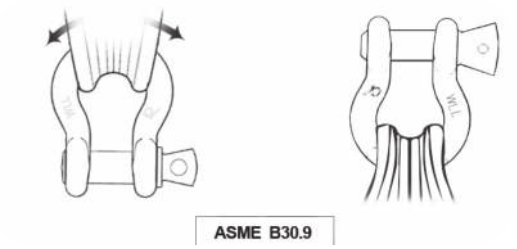
WEB SLINGS
Shall not be constricted or bunched between the ears of a clevis or shackle, or in a hook.

ROUND SLINGS
Shall not be constricted or bunched between the ears of a clevis or shackle, or in a hook.

The opening of fittings shall be proper shape and size to ensure that the fitting will seat properly on the round sling.

When a round sling is used with a shackle, it is recommended that it be used (rigged) in the bow of the shackle.

SYNTHETIC SLINGS RATED LOAD
Folding, bunching or pinching of synthetic slings, which occurs when used with shackles, hooks or other application will reduce the rated load.



When connecting Web or Round Slings, use conventional fittings with:
1. Large Radius. 2. Straight Pins. 3. Pads or use special fittings designed for Synthetic Slings.

SYNTHETIC SLING CONNECTIONS AND HITCHES

WEB SLING IDENTIFICATION INCLUDES:

SLING TYPE:
TC – TRIANGLE CHOKER
TT – TRIANGLE TRIANGLE
EE – EYE AND EYE
EN – ENDLESS

NUMBER OF PLIES: 1 OR 2
WEBBING GRADE: 9 OR 6
SLING WIDTH (INCH)

EE 2-9 04 x 12 ← **SLING LENGTH (INCH)**

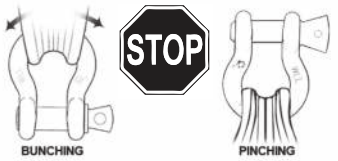
ROUND SLING IDENTIFICATION INCLUDES:

SLING NUMBER: 1-13
Sling numbers are for reference only. some round slings have different ratings.

SLING COLOR: PURPLE, GREEN, YELLOW, TAN, RED, WHITE, BLUE, ORANGE

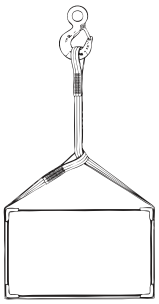
Sling color is not followed by all manufacturers, and some colors have more than one rated load.

Folding, bunching or pinching of synthetic slings, which occurs when used with shackles, hooks or other applications will reduce the rated load.



CHOKER CAPACITY

A choker hitch has 80% of the capacity of a single leg sling only if the angle of choke is 120 degrees or greater. a choke angle less than 120 degrees will result in a capacity as low as 40% of the single leg.



BASKET HITCH CAPACITY

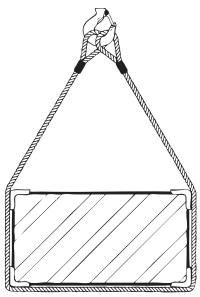
HORIZONTAL ANGLE	CAPACITY % OF SINGLE LEG
90	200%
60	170%
45	140%
30	100%

A true basket hitch has twice the capacity of a single leg only if the legs are vertical.

MULTIPLE LEG SLINGS

TRIPLE LEG SLINGS have 50% more capacity than double leg slings (at same sling angle) only if the center of gravity is in the center of connection points and legs adjusted properly (they must have an equal share of the load).

QUAD (4-LEG) SLINGS offer improved stability but provide increased capacity only if all legs share an equal share of the load.



ALWAYS SELECT AND USE WEB SLINGS AND ROUND SLINGS BY THE RATED LOAD SHOWN ON THE SLING IDENTIFICATION TAG, NEVER BY WIDTH, COLOR OR SLING NUMBER.

FORGED EYE BOLT

WARNINGS & APPLICATION INSTRUCTIONS

Regular Nut Eye Bolt G-291

Shoulder Nut Eye Bolt G-277

Machinery Eye Bolt S-279 / M-279

Important Safety Information - Read & 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.
- Do not leave threaded end of machinery eye bolt in aluminum loads for long periods of time as it may cause corrosion.

Assembly Safety:

- Never exceed load limits specified in Table I & Table 2.
- 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:

ANGLE FROM "IN-LINE"	ADJUSTED WORKING LOAD LIMIT
5 degrees	100% of rated working load
15 degrees	80% of rated working load
30 degrees	65% of rated 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 with sufficient I.D. to seat shoulder.
- Always screw eye bolt down completely for proper seating.
- Always tighten nuts securely against the load.

⚠ WARNING

- **Load may slip or fall if proper eye bolt assembly and lifting procedures are not used.**
- **A falling load can seriously injure or kill.**
- **Read and understand these instructions, and follow all eye bolt safety information presented here.**
- **Read, understand, and follow information in diagrams and charts below before using eye bolt assemblies.**

Shoulder Nut Eye Bolt – Installation for Angular Loading

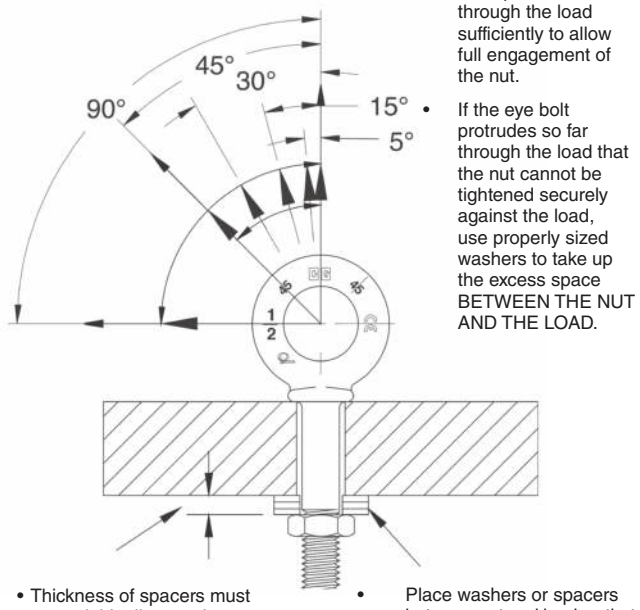


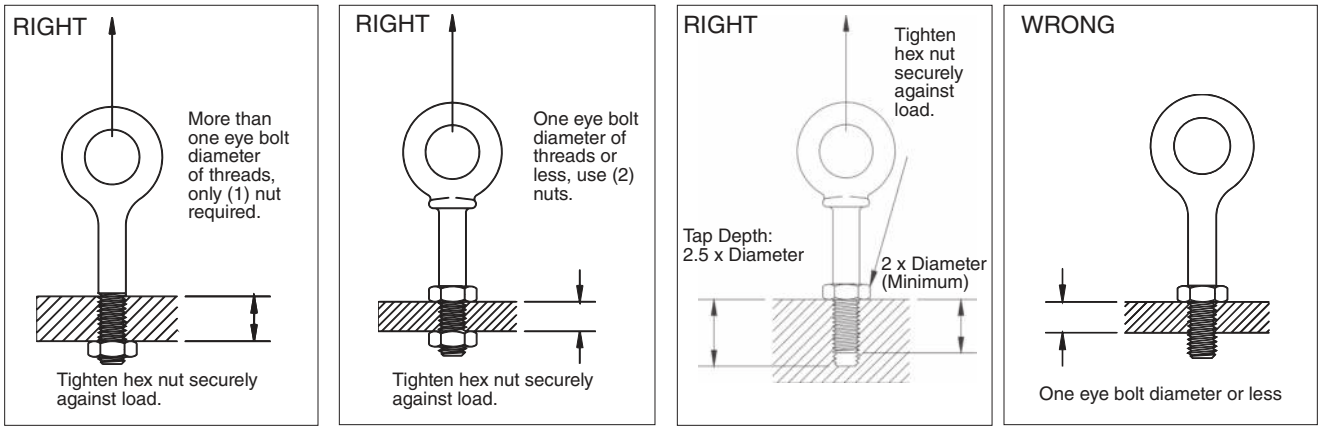
Figure 1

Table 1 (In-Line Load)	
Size (in)	Working Load Limit (kg)
1/4	295
5/16	544
3/8	703
1/2	1179
5/8	2359
3/4	3266
7/8	4808
1	6033
1-1/8	6804
1-1/4	9525
1-1/2	10890
1-3/4	15420
2	19050
2-1/2	29480

Table 2 (In-Line Load)	
Metric Size	Working Load Limit - kg
m6	200
m8	400
m10	640
m12	1000
m16	1800
m20	2500
m24	4000
m27	5000
m30	6000
m36	8500
m42	14000
m48	17300
m64	29500

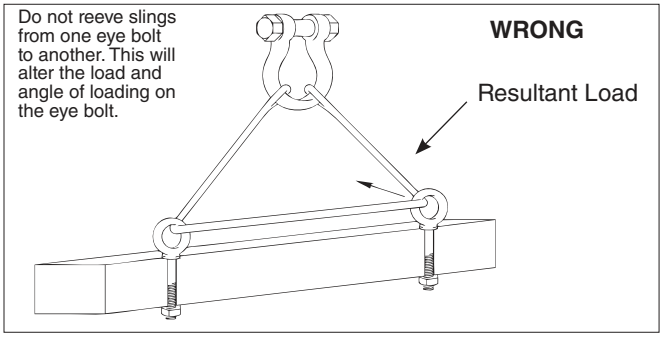
Important – Read and understand these instructions before using eye bolts.

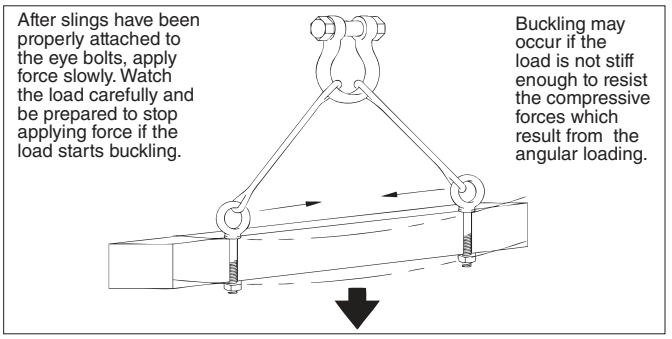
Regular Nut & Shoulder Nut Eye Bolt – Installation for In-Line Loading



Operating Safety

- Always stand clear of load.
- Always lift load with 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 eye bolt–see Table 1 & 2.
- When using lifting slings of two or more legs, make sure the loads in the legs are calculated using the angle from the vertical sling angle 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.

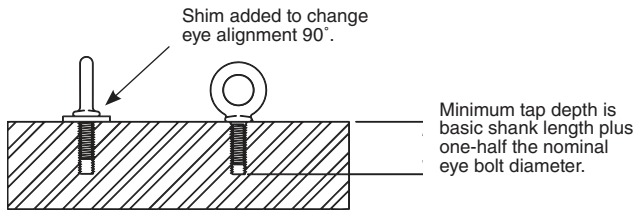
   For angular lifts, adjust working load as follows:

Direction of Pull (from In-Line)	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 3 to estimate the required shim thickness for the amount of unthreading rotation required.

Table 3

Eye Bolt Size (mm)	Shim Thickness Required to change Rotation 90° (mm)	Eye Bolt Size (in)	Shim Thickness Required to Change Rotation 90° (in)
M6	.25	1/4	.0125
M8	.31	5/16	.0139
M10	.38	3/8	.0156
M12	.44	1/2	.0192
M16	.50	5/8	.0227
M20	.62	3/4	.0250
M24	.75	7/8	.0278
M27	.75	1	.0312
M30	.88	1-1/8	.0357
M36	1.00	1-1/4	.0357
M42	1.13	1-1/2	.0417
M48	1.25	1-3/4	.0500
M64	1.50	2	.0556
—	—	2-1/2	.0625



CROSBY® PIVOT HOIST RING
WARNINGS & APPLICATION INSTRUCTIONS

HR-100

⚠ WARNING

- **Load may slip or fall if proper Hoist Ring assembly and lifting procedures are not used.**
- **A falling load can seriously injure or kill.**
- **Do not use with damaged slings or chain. For inspection criteria see ASME B30.9.**
- **Never apply load except in line with the pivot direction.**
- **Use only genuine Crosby bolts as replacements.**
- **Read and understand these warnings and application instructions.**

Pivot Hoist Ring Application / Assembly Instructions

- Use pivot hoist ring only with ferrous metal (steel, iron) workpiece. Do not leave threaded end of hoist ring in aluminium for long periods of time due to corrosion.
- After determining the loads on each pivot hoist ring, select the proper size using the Working Load Limit (WLL) ratings in Table 1 for UNC threads.
- Drill and tap the workpiece to the correct size to a minimum depth of one-half the threaded bolt diameter plus the effective thread projection length (see Table 1, on next page). To select proper bolt and thread sizes see Table 1 on next page.
- Install the pivot hoist ring to recommended torque with a torque wrench making sure the pivot hoist ring body meets the load (workpiece) surface. See rated load limit and bolt torque requirements imprinted on top of the pivot hoist ring body (see Table 1, on next page).
- Never use spacers between the pivot hoist ring body and workpiece surface.
- Always select proper load rated lifting device for use with pivot hoist ring.
- Attach lifting device ensuring free fit to pivot hoist ring bail (lifting ring) (Figure 1).
- Apply partial load and check proper pivot. Ensure load alignment is in the direction of pivot (Figure 4). There should be no interference between load (workpiece) and pivot hoist ring bail (Figure 2).

Pivot Hoist Ring Inspection / Maintenance

- Always inspect pivot hoist ring before use.
- Regularly inspect pivot hoist ring parts (Figure 3).
- Never use pivot hoist ring that shows signs of corrosion, wear or damage.
- Never use pivot hoist ring if bail is bent or elongated.
- Do not use parts showing cracks, nicks or gouges.
- Always be sure threads on bolts and receiving holes are clean, not damaged or worn, and fit properly.
- Always check with torque wrench before using an already installed pivot hoist ring.
- Always make sure there are no spacers (washers) used between pivot hoist ring body and the workpiece surface. Remove any spacers (washers) and retorque before use.
- Always ensure free movement of the bail. The bail should pivot 180 degrees (Figure 4).
- Always be sure total workpiece surface is in contact with the pivot hoist ring body mating surface. Drilled and tapped holes must be 90 degrees to load (workpiece) surface.
- Always make sure that the load is applied in the direction of pivot.

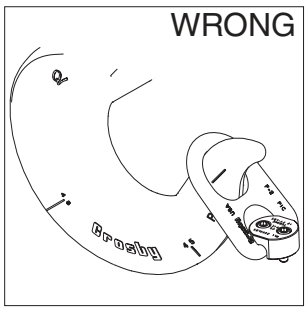


Figure 1

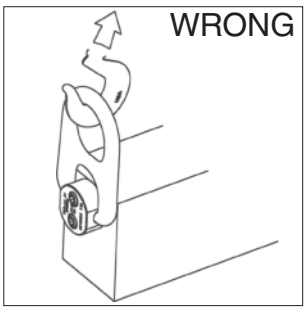


Figure 2

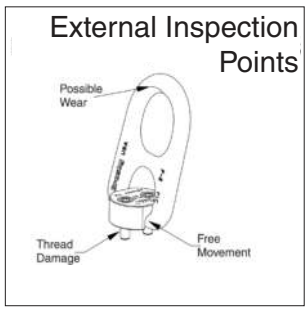


Figure 3

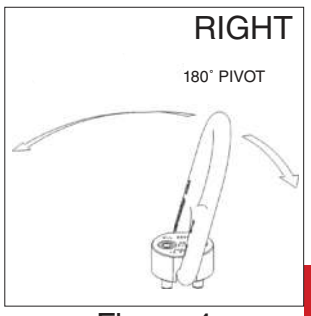


Figure 4

17

Operating Safety

- Never exceed the capacity (WLL) of the pivot hoist ring, See Table 1 for UNC threads.
- When using lifting slings of two or more legs, make sure the forces in the legs are calculated using the angle from the horizontal sling angle to the leg and select the proper size pivot hoist ring. When using a multi-leg lifting sling, the pivot hoist ring must be mounted so that the pivot direction is inline with the load applied.

Table 1
HR-100 Pivot Hoist Rings**

Working Load Limit* (Kg)	Torque in Nm.†	No. of Bolts	Dimensions (mm)	
			Bolt Size††	Effective Thread Projection Length
900	10	2	M8 - 1.25	19.08
1,150	16	2	M10 - 1.50	14.76
2,150	38	2	M12 - 1.75	34.76
5,100	38	4	M12 - 1.75	42.06
9,000	81	4	M16 - 2.0	39.36

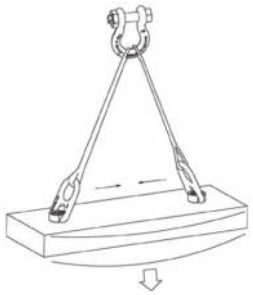
* Ultimate load is 5 times the working load limit. Individually proof tested to 2-1/2 times the working load limit.

† Tightening torque values shown are based upon threads being clean, dry and free of lubrication.

** Designed to be used with ferrous workpiece only.

†† Only use Crosby high strength replacement bolts. Do not use any other bolts.

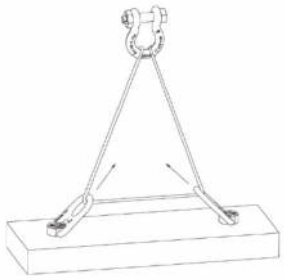
After slings have been properly attached to the hoist ring, apply force slowly.
Watch the load and be prepared to stop applying force if the load starts buckling.



Buckling may occur if the load is not stiff enough to resist the compressive forces which result from the angular loading.

Do not reeve slings from one bail to another. This will alter the load and angle of loading on the hoist ring.

WRONG



SIDE PULL HR-1200

WARNINGS & APPLICATION INSTRUCTIONS

HR-1200

Hoist Ring Application / Assembly Instruction

- The Crosby side pull swivel hoist ring is designed to accept standard Crosby fittings to facilitate wider slings and quick attachment. In order to use the larger fittings, the load rating on the (shackle) fitting may be greater than the hoist ring frame. **Never exceed the Working Load Limit of the hoist ring frame.**
- Use swivel hoist ring only with a ferrous metal (steel, iron) or non-ferrous (i.e., aluminum) loads (workpiece). Do not leave threaded end of hoist ring in aluminum loads for long time periods due to corrosion.
- After determining the loads on each hoist ring, select the proper size hoist ring using the Working Load Limit ratings in Table 1 for UNC threads and Table 2 for Metric threads (On next page.)
- For Subsea or Metric environment application, use the HR-1200 CT Series hoist ring only.
- Drill and tap the workpiece to the correct size to a minimum depth of one-half the threaded shank diameter plus the threaded shank length.
- Install hoist ring to recommended torque with a torque wrench making sure the bushing flange is fully supported by the load (workpiece) surface. See rated load limit and bolt torque requirements imprinted on hoist ring body (See Table 1 or Table 2).
- Never use spacers between bushing flange and mounting surface.
- Always select proper lifting device for use with Swivel Hoist Ring (See Tables 1 & 2 On next page).
- Attach lifting device ensuring free fit to hoist shackle (See Figure 3).
- Apply partial load and check proper rotation and alignment of shackle. There should be no interference between load (workpiece) and hoist shackle (See Figure 1 and Figure 3).
- The Hoist ring should rotate into normal operating position, with shackle aligned with load as shown in Figure 3. If shackle is oriented as shown in Figure 4, **DO NOT LIFT**.
- **Special Note:** when a Hoist Ring is installed with a retention nut, the nut must have full thread engagement and must meet one of the following standards to develop the Working Load Limit (WLL).
  1. ASTM A-563 (A) Grade D Hex Thick
  2. (B) Grade DH Standard Hex
  3. SAE Grade 8 - Standard Hex

Hoist Ring Inspection / Maintenance

- Always inspect hoist ring before use.
- Regularly inspect hoist ring parts (Figure 2).
- For hoist rings used in frequent load cycles or on pulsating loads, the bolt threads should be periodically inspected by magnetic particle or dye penetrant.
- Do not use part showing cracks, nicks or gouges.
- Repair minor nicks or gouges to hoist frame by lightly grinding until surfaces are smooth. Do not reduce original dimension more than 10%. Do not repair by welding.

⚠ WARNING

- **Loads may slip or fall if proper Hoist Ring assembly and lifting procedures are not followed.**
- **A falling load may cause serious injury or death.**
- **Install hoist ring bolt to torque requirements listed in tables.**
- **The side pull hoist ring frame will be only one part of a lifting system with several components (i.e., shackles and slings). Never exceed the Working Load Limit of the hoist ring frame.**
- **Do not use damaged slings or chain. For inspection criteria, see ASME B30.9.**
- **Read and understand these instructions before using hoist ring.**
- **The tension of the sling must be calculated or measured and can not exceed the working load limit (WLL) of the load connection fitting.**
- **Use only genuine Crosby parts as replacements.**
- **Replacement bolt kits are available from Crosby.**

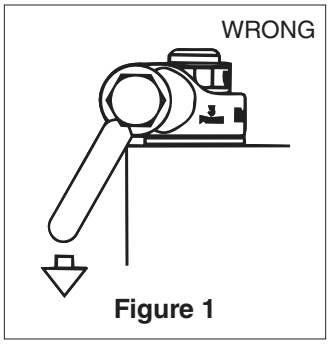


Figure 1

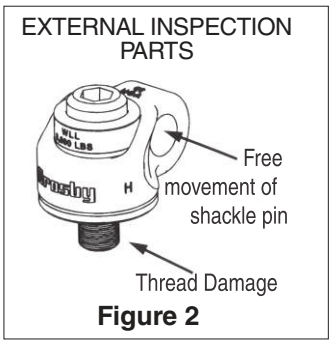


Figure 2

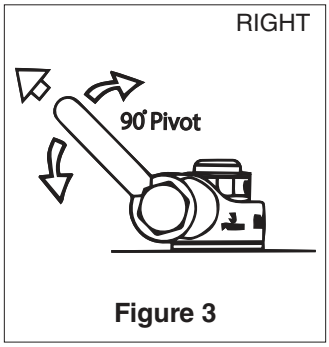


Figure 3

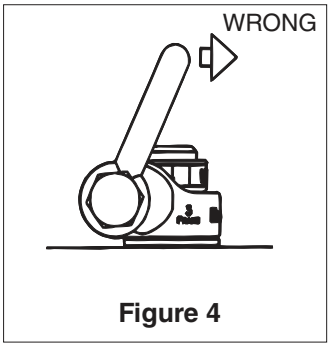
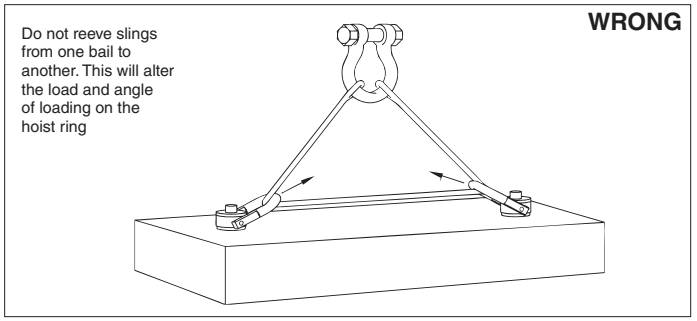


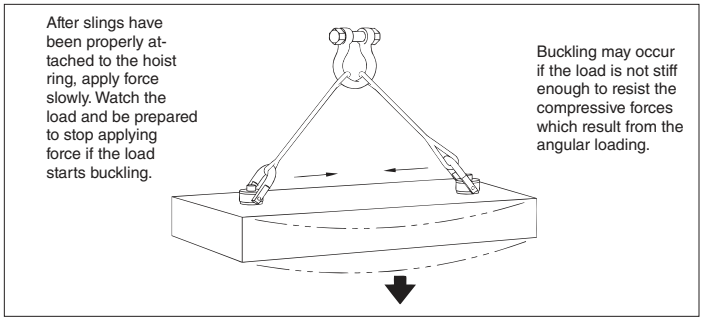
Figure 4

- Never use hoist ring that shows signs of corrosion, wear or damage.
- Never use hoist ring if components are bent or elongated.
- Always be sure threads on bolt and receiving tapped holes are clean, undamaged, and fit properly.
- Always check with torque wrench before using an already installed hoist ring.
- Always make sure there are no spacers (washers) used between bushing flange and the mounting surface. Remove any spacers (washers) and retorque before use.
- Always ensure free movement of shackle. The shackle should pivot 90° and the hoist ring should swivel 360° (See Figure 3).
- Always be sure total workpiece surface is in contact with hoist ring bushing mating surface. Drilled and tapped hole must be 90° to load (workpiece) surface.

OPERATING SAFETY

- Never exceed the capacity of the hoist ring, see Table 1 for UNC threads and Table 2 for Metric threads.
- When using lifting slings of two or more legs, make sure the forces in the legs are calculated using the angle from the horizontal sling angle to the leg and select the proper size swivel hoist ring to allow for the angular forces.





HR-1200 UNC Threads

TABLE 1

Frame Size	Working Load Limit * (lb)	Hoist Ring Bolt Torque in Ft • lb †	Bolt Size ‡ (in)	Effective Thread Projection Length (in)	Recommended Shackles	
					Red Pin ® Shackles 209, 210, 213 215, 2130, 2150	Red Pin ® Web Shackles S-281
1	650†† 800††	7 12	5/16 - 18 x 1.5 3/8 - 18 x 1.5	.59 .59	1/2" - (2) 5/8" - (3-1/4)	2" - (3-1/4)
2	2000 2000†† 3000 3000††	28 28 60 60	1/2 - 13 x 2.0 1/2 - 13 x 2.5 5/8 - 11 x 2.0 5/8 - 11 x 2.75	.71 1.21 .71 1.46	5/8" - (3-1/4) 3/4" - (4-3/4)	2" - (3-1/4) 1-1/2" - (4-1/2)
3	5000 5000†† 6500 6500†† 8000 8000††	100 100 160 160 230 230	3/4 - 10 x 2.75 3/4 - 10 x 3.5 7/8 - 9 x 2.5 7/8 - 9 x 3.5 1 - 8 x 3.0 1 - 8 x 4.0	1.46 1.63 .90 1.68 1.15 2.15	7/8" - (6-1/2)	2" - (6-1/4)
4	14000	470	1-1/4 - 7 x 4.5	2.22	1" - (8-1/2) 1-1/8" - (9-1/2) 1-1/4" - (12)	3" - (8-1/2)
5	17200 29000	800 1100	1-1/2 - 6 x 6.5 2 - 4-1/2 x 6.5	2.88 2.98	1-3/8" - (13-1/2) 1-1/2" - (17) 1-3/4" - (25)	—

HR-1200M Metric Threads

TABLE 2

Frame Size	Working Load Limit * (kg)	Hoist Ring Bolt Torque in Nm †	Bolt Size ‡ (mm)	Effective Thread Projection Length (mm)	Recommended Shackles	
					Red Pin ® Shackles 209, 210, 213 215, 2130, 2150	Red Pin ® Web Shackles S-281
1	300 400	10 16	M8 x 1.25 x 40 M10 x 1.5 x 40	16.9 16.9	1/2" - (2) 5/8" - (3-1/4)	2" - (3-1/4)
2	1000 1400	38 81	M12 x 1.75 x 50 M16 x 2.00 x 60	17.2 27.2	5/8" - (3-1/4) 3/4" - (4-3/4)	2" - (3-1/4) 1-1/2" - (4-1/2)
3	2250 3500	136 312	M20 x 2.50 x 75 M24 x3.00 x 80	28.1 33.1	7/8" - (6-1/2)	2" - (6-1/4)
4	6250	637	M30 x 3.5 x 120	65.1	1" - (8-1/2) 1-1/8" - (9-1/2) 1-1/4" - (12)	3" - (8-1/2)
5	7750 10000 13000	1005 1005 1350	M36 x 4.0 x 150 M42 x 4.5 x 160 M48 x 5.0 x 160	60.6 70.6 70.6	1-3/8" - (13-1/2) 1-1/2" - (17) 1-3/4" - (25)	—

Designed to be used with Ferrous workpiece only.

* Ultimate load is 5 times the Working Load Limit. Individually proof tested to 2-1/2 times the Working Load Limit.
† Tightening torque values shown are based upon threads being clean, dry and free of lubrication.
†† Long bolts are designed to be used with soft metal (i.e., aluminum) workpiece. While the long bolts may also be used with ferrous metal (i.e., steel & iron) workpieces, short bolts are designed for ferrous workpieces only.
‡ Bolt specification is a Grade 8 Alloy socket head cap screw to ASTM A574. All threads are UNC - 3A.
‡‡ Bolt specification is a Grade 12.9 Alloy socket head cap to DIN 912. All threads are metric (ASME/ANSI B18.3.1m).

CROSBY® WELD-ON PIVOTING LINK

WARNING & APPLICATION INSTRUCTIONS

S-265

⚠ WARNING

- **Loads may disengage from link if proper welding, assembly, and lifting procedures are not used.**
- **A falling load may cause serious injury or death.**
- **Do not use with damaged slings or chain. For sling inspection criteria see ASME B30.9.**
- **Read and understand these instructions before welding on, or using the pivoting link.**

Important Safety Information - Read and Follow

- Use weld-on pivoting link only with ferrous metal (steel) workpiece.
- After determining the loads on each weld-on pivoting link, select the proper size using the Working Load Limit (WLL) ratings in Table 1 on next page.
- Always make sure the weld-on pivoting link and mounting surface is free of dirt or contaminants before installation.
- Never use spacers between the weld-on pivot link and mounting surface.
- Always select proper load rated lifting device for use with weld-on pivoting link.
- Attach lifting device ensuring free movement of weld-on pivoting link bail (Figure 1).
- Apply partial load and check proper alignment. There should be no interference between load (workpiece) and weld-on pivoting link (Figure 2).
- Always ensure free movement of bail. The bail should pivot 180 degrees (Figure 4).
- The support structure that the pivot link is attached to must be of suitable size, composition and quality to support the anticipated loads of all operating positions. The required support structure thickness for a given application is dependent on variables such as unsupported length and material strength, and should be determined by a qualified individual.
- Never repair, alter, rework or reshape the pivoting link bail by welding, heating, burning or bending.

Weld-on Pivoting Link Inspection / Maintenance

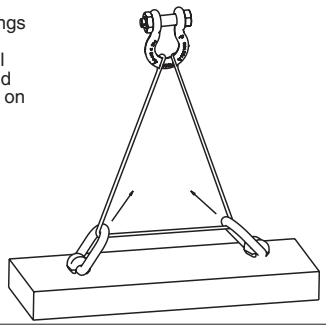
- Always inspect weld-on pivoting link before use.
- Regularly inspect weld-on pivoting link parts (Figure 3).
- Never use weld-on pivoting link that shows signs of corrosion, wear or damage.
- Never use weld-on pivoting link if bail is bent or elongated.
- Do not use part showing cracks, nicks or gouges.
- Always make sure there are no spacers used between weld-on pivoting link and the mounting surface.
- Always be sure workpiece surface is in total contact with the weld-on pivoting link base mating surface.
- Always inspect the weld-on pivoting link bail and base for wear.
- A visual periodic inspection of the weld should be performed. Check the weld visually, or use a suitable NDE method if required.

Operating Safety

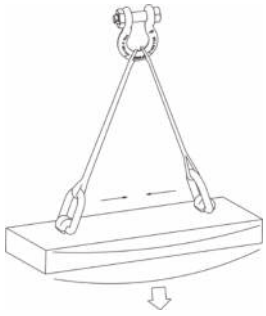
- Never exceed the capacity (WLL) of the weld-on pivoting link (Table 1, next page).
- Always apply load within 90° of inline, at any pivot angle (Figure 4 & 5).
- When using lifting slings of two or more legs, make sure the forces in the legs are calculated using the angle from the horizontal sling angle to the leg and select the proper size link.

Do not reeve slings from one bail to another. This will alter the load and angle of loading on the pivoting link.

WRONG



After slings have been properly attached to the pivoting link, apply force slowly. Watch the load and be prepared to stop applying force if the load starts buckling.



Buckling may occur if the load is not stiff enough to resist the compressive force which results from the angular loading.

Figure 1

Figure 2

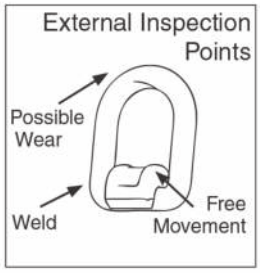


Figure 3

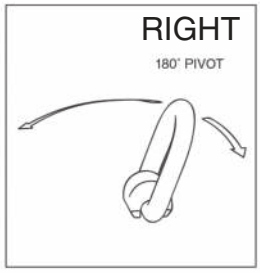


Figure 4

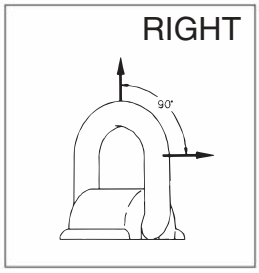


Figure 5

17

Weld-on Pivoting Link Welding Guidelines

1. Select the correct size weld-on pivoting link to be used. Be sure to calculate the maximum load that will be applied to the weld-on pivoting link.
2. Place the weld-on pivoting link onto the mounting surface. The bottom of the link base must be parallel and even with the mounting surface.
3. Welding is to be performed by a qualified welder using a qualified procedure in accordance with American Welding Society and/or American Society of Mechanical Engineers requirements. Always follow your country or local mandatory regulations or codes.
4. The following welding recommendations should be included in the qualified procedure for welding to low or medium carbon plate steel. For welding to other grades of steel, a qualified weld procedure must be developed.
   - A. Saddle material is equivalent to SAE/AISI 1024, EN S355J2, or DIN 1.0570.
   - B. Weld material is to have a minimum tensile strength of 70,000 PSI (such as AWS A5.1 E-7018). Observe the electrode manufacturer's recommendations. Completely fill internal fillet created between weld-on pivoting link base and mounting surface.
   - C. Before welding, all weld surfaces must be clean and free from rust, grease, paint, slag and any other contaminants.
   - D. Fillet weld leg size should be minimum shown in Table 1. Weld profiles to be in accordance with AWS. Weld size is measured by length of leg.
   - E. Welding should be carried out in a minimum of two passes to ensure adequate root penetration at the base of the pivoting link.
   - F. Weld full length of "D" dimension on both sides of link base (Figure 5).
   - G. Do not weld close to the bail. After welding, ensure bail pivots full 180° without interfering with the weld.
   - H. Do not rapidly cool the weld.
   - I. The ends of the weld must be ground sufficiently so that the weld-on pivoting link will fit flush against the mounting surface.
   - J. A thorough inspection of the weld should be performed. No cracks, pitting, inclusions, notches or undercuts are allowed. If doubt exists, use a suitable NDE method, such as magnetic particle or liquid penetrant to verify.
   - K. If repair is required, grind out the defect and re-weld using the original qualified procedure.

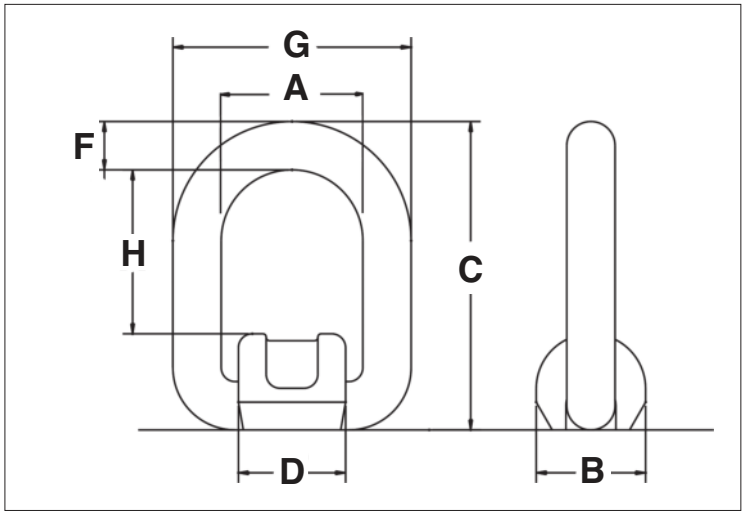


Figure 5

Table 1
S-265 Weld-on Pivoting Links*

Stock Number	Working Load Limit (t)		Dimensions (mm)								Weight Each (kg)
	Design Factor 5:1	Design Factor 4:1	A	B	C	D	F	G	H	Minimum Fillet Weld Size	
1290740	1	1.2	40	36	83	35	13	66	42	3	.40
1290768	2.5	3.2	45	44	99	42	18	81	48	3	.60
1290786	4	5.3	55	50	123	49	22	99	57	6	1.20
1290802	6.4	8	70	64	144	64	26	122	67	6	2.40
1290820	12	15	97	90	193	86	34	165	94	8	5.90

*Designed to be used with ferrous workpiece only.

CROSBY SWIVEL HOIST RING

WARNING & APPLICATION INSTRUCTIONS

HR-125/SS-125
(Red Washer)
HR-125M
SS-125M
(Silver Washer)

HR-1000
(Red Washer)
HR-1000M
(Sliver Washer)
HR-1000CT
(Blue Washer)

Hoist Ring Application Assembly Safety

- Use swivel hoist ring only with a ferrous metal (steel, iron) or soft metal (i.e., aluminum) load (workpiece). Do not leave threaded end of hoist ring in aluminum loads for long time periods due to corrosion.
- For subsea or marine environment applications, use the HR-1000CT series Hoist Ring only.
- After determining the loads on each hoist ring, select the proper size hoist ring using the Working Load Limit ratings in Tables 1, 3, and 5 for UNC threads and Tables 2, 4 and 6 for Metric threads (on next page).
- Drill and tap the workpiece to the correct size to a minimum depth of one-half the threaded shank diameter plus the threaded shank length. See rated load limit and bolt torque requirements imprinted on top of the swivel trunnion (See Table 1 through Table 6 on next page).
- When a hoist ring is used in a side load application, ensure equal loading on the pins by aligning the bail as shown in (Fig. 3).
- Always be sure total hoist ring bushing mating surface is in contact with the (workpiece) surface. Drilled and tapped hole must be 90 degrees to load (workpiece) surface.
- Install hoist ring to recommended torque with a torque wrench making sure the bushing flange meets the load (workpiece) surface.
- Never use spacers between bushing flange and mounting surface.
- Always select proper load rated lifting device for use with Swivel Hoist Ring.
- Attach lifting device ensuring free fit to hoist ring bail (lifting ring) (Fig. 1).
- Apply partial load and check proper rotation and alignment. There should be no interference between load (workpiece) and hoist ring bail (Fig. 2).
- Special Note: When a Hoist Ring is installed with a retention nut, the nut must have a full thread engagement and must meet one of the following standards to develop the Working Load Limit (WLL).

UNC NUTS

1. ASTM A-563
Grade D
(Heavy Hex or Hex Thick)
Grade DH
Grade DH3
2. ASTM A-194
Grade 2H
Grade 4
Grade 7
3. FNL
Grade 9
4. SAE J995
Grade 8

METRIC NUTS

1. ASTM A-563M
Class 10S
2. ISO 898-2
(EN 20898-2/DIN 267-4)
Class 10
Class 12

Minimum thread engagement length is one times thread diameter.

Hoist Ring Inspection / Maintenance

- Always inspect hoist ring before use.
- Regularly inspect hoist ring parts.
- Never use hoist ring that shows signs of corrosion, wear or damage.
- Never use hoist ring if bail is bent or elongated.
- Always be sure threads on shank and receiving hole are clean, not damaged, and fit properly.
- Always check with torque wrench before using an already installed hoist ring.
- Always make sure there are no spacers (washers) used between bushing flange and the mounting surface. Remove any spacers (washers) and retorque before use.
- Prior to loading always ensure free movement of bail. The bail should pivot 180 degrees and swivel 360 degrees.

⚠ WARNING

- **Loads may slip or fall if proper Hoist Ring assembly and lifting procedures are not used.**
- **A falling load may cause serious injury or death.**
- **Install hoist ring bolt to torque requirements listed in tables 1, 2, 3, 4, 5, & 6 for the HR-125, HR-1000, HR-1000CT, HR-125M, HR-1000M and SS-125.**
- **Read, understand and follow all instructions and chart information.**
- **Do not use with damaged slings, chain, or webbing. For inspection criteria see ASME B30.9.**
- **The tension of the sling must be calculated or measured and can not exceed the working load limit (WLL) of the load connection fitting.**
- **Use only genuine Crosby parts as replacements.**

Operating Safety

- Never exceed the capacity of the swivel hoist ring, see Tables 1, 2 and 5 for UNC threads and Tables 3, 4 and 6 for Metric threads (See next page for tables.).
- When using lifting slings of two or more legs, make sure the forces in the legs are calculated using the angle from the horizontal sling angle to the leg and select the proper size swivel hoist ring to allow for the angular forces.

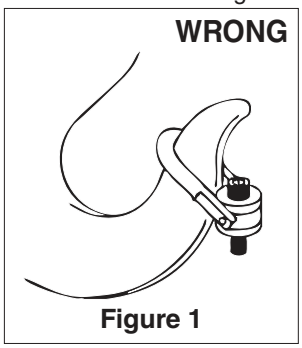


Figure 1

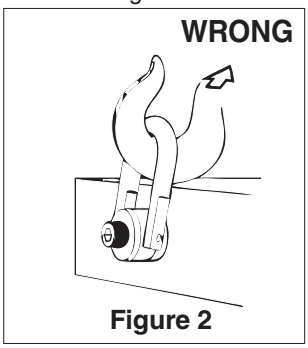


Figure 2

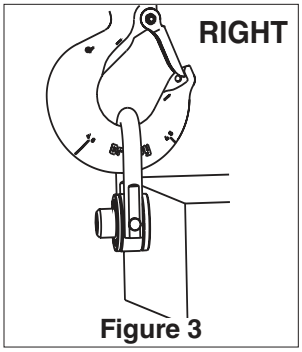


Figure 3

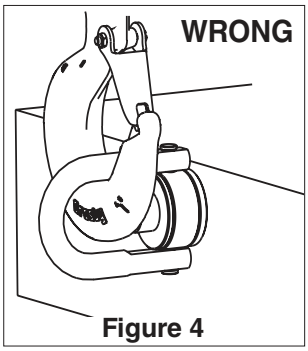


Figure 4

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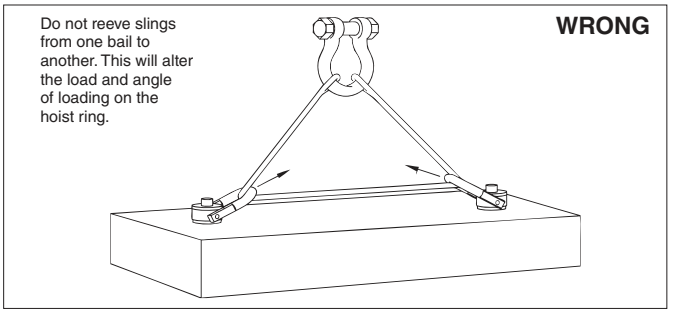
Table 1

WLL* 5:1 (lb)	Hoist Ring Bolt Torque Ft•lbs †	HR-125 Bolt Size ‡ (in)	HR-125 Effective Thread Projection Length (in)	HR-1000 Bolt Size ‡ (in)	HR-1000 Effective Thread Projection Length (in)
800 ††	7	5/16 - 18 x 1.50	.58	5/16 - 18 x 1.50	.52
1000 ††	12	3/8 - 16 x 1.50	.58	3/8 - 16 x 1.50	.52
2500	28	1/2 - 13 x 2.00	.70	1/2 - 13 x 2.25	.69
2500 ††	28	1/2 - 13 x 2.50	1.20	1/2 - 13 x 2.75	1.19
4000	60	5/8 - 11 x 2.00	.70	5/8 - 11 x 2.25	.69
4000 ††	60	5/8 - 11 x 2.75	1.45	5/8 - 11 x 3.00	1.44
5000	100	3/4 - 10 x 2.25	.95	3/4 - 10 x 2.50	.94
5000 ††	100	3/4 - 10 x 2.75	1.45	3/4 - 10 x 3.00	1.44
7000 Ω	100	3/4 - 10 x 2.75	.89	3/4 - 10 x 3.00	.85
7000 ††Ω	100	3/4 - 10 x 3.50	1.64	3/4 - 10 x 3.50	1.35
8000	160	7/8 - 9 x 2.75	.89	7/8 - 9 x 3.00	.85
8000 ††	160	7/8 - 9 x 3.50	1.64	7/8 - 9 x 3.50	1.35
10000	230	1 - 8 x 3.00	1.14	1 - 8 x 3.50	1.35
10000 ††	230	1 - 8 x 4.00	2.14	1 - 8 x 4.50	2.35
15000	470	1-1/4 - 7 x 4.50	2.21	1-1/4 - 7 x 5.00	2.09
24000	800	1-1/2 - 6 x 6.75	2.97	1-1/2 - 6 x 5.50	2.59
30000	1100	2 - 4-1/2 x 6.75	2.97	—	—
50000	2100	2-1/2 - 4 x 8.00	4.00	—	—
75000	4300	3 - 4 x 10.50	5.00	—	—
100000	5100	3-1/2 - 4 x 13.00	7.00	—	—

Ω Ultimate Load is 4.5 times Working Load Limit for 7000# Hoist Ring when tested in 90° orientation. All sizes are individually proof tested to 2-1/2 times the Working Load Limit. *, †, ††, ‡ (See footnotes at bottom of Table 5).



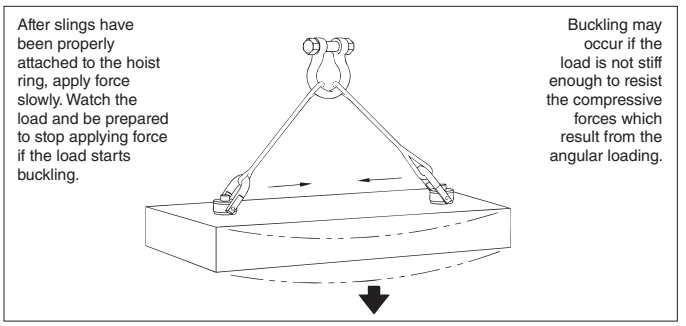


Table 2

Working Load Limit (kg) ****		HR-1000MCT		
Design Factor 5:1	Design Factor 4:1	Hoist Ring Bolt Torque in (Nm) †	Bolt Size (mm) ‡‡	Effective Thread Projection Length (mm)
825	1030	38	M12 x 1.75 x 55	15.6
1350	1690	81	M16 x 2.00 x 65	25.5
2250	2810	136	M20 x 2.50 x 80	25.3
3175	3970	312	M24 x 3.00 x 90	35.4
5450	6810	637	M30 x 3.50 x 140	65.9
7450	9310	1005	M36 x 4.00 x 130	56.3
13250	16560	1350	M48 x 5.00 x 180	50.7

Table 3

HR-1000CT

Working Load Limit 5:1 (lb) ****	Hoist Ring Bolt Torque in (Ft • lbs) †	Bolt Size (in) Δ	Effective Thread Projection Length (in)
1900	28	1/2 - 13 x 2.25	.70
1900	28	1/2 - 13 x 2.75	1.20
3000	60	5/8 - 11 x 2.25	.70
4800	100	3/4 - 10 x 3.00	.85
6200	160	7/8 - 9 x 3.00	.85
8300	230	1 - 8 x 3.50	1.35
12500	470	1 1/4 - 7 x 5.00	2.10
20000	800	1 1/2 - 6 x 5.50	2.60
20000	800	1 1/2 - 8 x 5.50	2.60
28000	1100	2 - 4.5 x 7.50	3.20
45000	2100	2 1/2 - 4 x 9.50	3.73

Table 4

Working Load Limit (kg)***			HR-125M		HR-1000M	
Design Factor 5:1	HR-125M Design 4:1	Hoist Ring Bolt Torque in Nm †	Bolt Size ‡‡ (mm)	HR-125M Effective Thread Projection Length (mm)	Bolt Size ‡‡ (mm)	HR-1000M Effective Thread Projection Length (mm)
400	500	10	M 8 X 1.25 X 40	16.9	M 8 X 1.25 X 40	15.2
450	550	16	M 10 X 1.50 X 40	16.9	M 10 X 1.50 X 40	15.2
1050	1300	38	M 12 X 1.75 X 50	17.2	M 12 X 1.75 X 55	15.5
1900	2400	81	M 16 X 2.00 X 60	27.2	M 16 X 2.00 X 65	25.5
2150	2700	136	M 20 X 2.50 X 65	31.2	M 20 X 2.50 X 70	30.5
3000	3750	136	M 20 X 2.50 X 75	28.1	M 20 X 2.50 X 80	25.4
4200	5250	312	M 24 X 3.00 X 80	33.1	M 24 X 3.00 X 90	35.4
7000	8750	637	M 30 X 3.50 X 120	65.1	M 30 X 3.50 X 140	66.2
11000	13750	1005	M 36 X 4.00 X 150	60.6	M 36 X 4.00 X 150	56.2
12500	15600	1005	M 42 x 4.50 x 160	70.6	—	—
13500	16900	1350	M 48 x 5.00 x 160	101	—	—
22300	27900	2847	M 64 x 6.00 x 204	101	—	—
31500	39400	5830	M 72 x 6.00 x 265	132	—	—
44600	55800	6914	M 90 x 6.00 x 330	177	—	—

See Footnotes on next page.

† Tightening torque values shown are based upon threads being clean, dry and free of lubrication.

Footnotes below relate to tables 1-4

* Ultimate load is 5 times the Working Load Limit. Individually proof tested to 2-1/2 times the Working Load Limit.

** Ultimate load is 4 times the Working Load Limit. Individually proof tested to 2-1/2 times the Working Load Limit.

*** Individually proof tested to 2-1/2 times the Working Load Limit based on 4:1 design factor

**** Ultimate load is 5 times the Working Load Limit. Individually proof tested to 2 times the Working Load Limit.

†† Long bolts are designed to be used with soft metal (i.e., aluminum) workpiece. While the long bolts may also be used with ferrous metal (i.e., steel & iron) workpieces, short bolts are designed for ferrous workpieces only.

‡ Bolt specification is an Alloy socket head cap screw to ASTM A574. All threads are UNC .

‡‡ Bolt specification is a Grade 12.9 Alloy socket head cap screw to DIN 912. All threads are metric (ASME/ANSI B18.3.1m)

Δ Bolt specification is a Grade L7 or L43 Alloy socket head cap screw to ASTM A320. All threads are UNC.

‡‡‡ Tighten bolt to specified torque, then tighten nut to specified torque.

All Swivel Hoist Rings are individually proof tested.

Table 5

SS-125 ¥¥

Working Load Limit (lb) ¥	Torque in Ft • lbs †	Bolt Size (in) §	Effective Thread Projection (in)
400	3.5	5/16 - 18 x 1	.29
400	3.5	5/16 - 18 x 1.25	.54
500	6	3/8 - 16 x 1.25	.54
1250	14	1/2 - 13 x 2	.78
1250	14	1/2 - 13 x 2.25	1.03
1250	14	1/2 - 13 x 2.5	1.28
2000	30	5/8 - 11 x 2	.78
2000	30	5/8 - 11 x 2.25	1.03
2000	30	5/8 - 11 x 2.5	1.28
2500	50	3/4 - 10 x 2.25	1.03
2500	50	3/4 - 10 x 2.75	1.53
3500	50	3/4 - 10 x 2.75	1.04
3500	50	3/4 - 10 x 3.25	1.54
4000	80	7/8 - 9 x 2.75	1.04
4000	80	7/8 - 9 x 3	1.29
5000	115	1 - 8 x 3	1.29
5000	115	1 - 8 x 3.25	1.54
5000	115	1 - 8 x 4	2.29
7500	235	1-1/4 - 7 x 4	1.89
12000	400	1-1/2 - 6 x 5.5	2.70
15000	550	2 - 4-1/2 x 5.75	2.96
25000	1050	2-1/2 - 4 x 8	4.00
25000	1050	2-1/2 - 8 x 8	4.00
37500	2150	3 - 4 x 10.25	5.00
50000	2550	3-1/2 - 4 x 13	7.00

Table 6

SS-125M ¥¥

Working Load Limit (kg) ¥	Torque in (Nm) †	Bolt Size (mm) §§	Effective Thread Projection (mm)
200	4	M 8 x 1.25x30	13
250	8	M 10 x 1.50x35	18
525	18	M 12 x 1.75x50	19
950	40	M 16 x 2.00x60	29
1075	68	M 20 x 2.50x65	34
1500	68	M 20 x 2.50x75	32
2100	108	M 24 x 3.00x80	37
2100	108	M 30 x 3.50x110	58
3500	318	M 30 x 3.50x95	42
3500	318	M 30 x 3.50x115	62
5500	542	M 36 x 4.00x135	64
6250	542	M 42 x 4.50x155	82
6750	746	M 48 x 5.00x155	82
11150	1423	M 64 x 6.00x205	101
15750	2915	M 72 x 6.00x265	132
22300	3459	M 90 x 6.00x330	177

Footnotes below relate to Tables 6 and 7

¥ Ultimate load is 5 times the Working Load Limit. Individually proof tested to 2 times the Working Load Limit.

¥¥ All components are 316 Stainless Steel, except Bolt Retainers, which are made from15-7 PH (UNS 15700) magnetic stainless steel.

§ Bolt specification is 316 Stainless Steel socket head cap screw to ASTM F 837 Group 1 (316).

§§ Bolt specification is 316 Stainless Steel socket head cap screw to ASTM F837M (316).

All threads are Metric (ASME/ANSI B18.3.1M).

CROSBY Slide-Loc® Lifting Point

WARNINGS & APPLICATION INSTRUCTIONS

SL-150 & SL-150M
Slide-Loc Lifting Point

⚠ WARNING

- **Load may slip or fall if proper Lifting Point assembly and lifting procedures are not used.**
- **A falling load can seriously injure or kill.**
- **Do not use with damaged slings or chain. For inspection criteria see ASME B30.9.**
- **Use only genuine Crosby bolts as replacements.**
- **Read and understand these warnings and application instructions.**
- **Do not load the Lifting Point if the slide lock is in the installation position (Red QUIC-CHECK mark is visible).**
- **The tension of the sling must be calculated or measured and can not exceed the working load limit (WLL) of the load connection fitting.**

LIFTING POINT APPLICATION / ASSEMBLY INSTRUCTIONS

- Lifting Points incorporate a red indented area on each forged bail that provides a quick indicator to determine whether the Lifting Point is in the installation position or the lifting position. If the **QUIC-CHECK** mark is visible, product is in installation mode and shall not be used for lifting.

QUIC-CHECK®

- **To check,** look for indented surface (red) on bail. A visible **QUIC-CHECK** mark (Figure 2) means the slide lock and bolt are engaged for installation. When Lifitng Point is properly installed, move slide lock to lifting position (Figure 1).
- Use Lifting Points only with a ferrous metal (i.e., steel, iron) or soft metal (e.g., aluminum) load (workpiece). Do not leave threaded end of Lifting Point in aluminum loads for long time periods due to corrosion.
- When using lifting slings of two or more legs, make sure the forces in the legs are calculated using the angle from the horizontal sling angle to the leg and select the proper size swivel hoist ring to allow for the angular forces.
- After determining the loads on each Lifting Point, select the proper size Lifting Point using the Working Load Limit ratings in Table 1 for UNC threads and Table 2 for Metric threads.
- Never exceed rated capacity of Lifting Point. See Table 1 for UNC threads, and Table 2 for metric threads.
- Drill and tap the workpiece to the correct size to a minimum depth of one-half the threaded shank diameter plus the threaded shank length.
- Install Lifting Point by hand so that the bushing flange is held tight to the mounting surface by the bolt. The bushing flange should engage the entire mounting surface.
- Never use spacers between bushing flange and mounting surface.
- Always select proper load rated lifting device for use with Lifting Points.
- Attach lifting device ensuring free fit to Lifting Point bail (Figure 6).
- Never lift load if Red **QUIC-CHECK** indicator is visible (Figure 2).
- Apply partial load and check proper rotation and alignment. The Lifting Point bail should be in-line with the direction of the load.

USING THE LIFTING POINT

Slide-Loc LIFTING Position

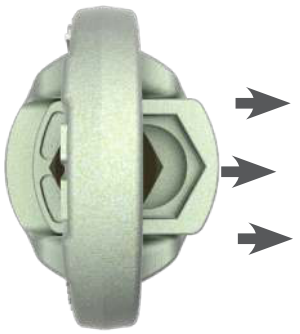


Figure 1

Slide-Loc INSTALLATION Position

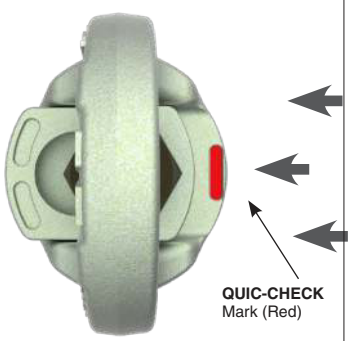


Figure 2

- Do not load in a direction perpendicular to the bail (Figure 5).
- Special Note: Recommended thru hole clearance is 1/32" for bolts smaller than 1" and 2/32" for bolts 1" and larger in diameter.

1. ASTM A-563

   A. Grade D Hex Thick

   B. Grade DH Standard Hex

2. SAE Grade 10.9 — Standard Hex

To place the Lifting Point:

- Move the slide lock into the installation position, such that the four flats on the bolt head are engaged (Figure 2).
- Thread the bolt of the Lifting Point into the hole of your workpiece making sure that the entire length of exposed bolt thread is engaged. If the hole on your workpiece is not threaded, ensure that the Lifting Point is secured with a nut on the opposite side of your workpiece and that that nut thread is fully engaged.

- Before applying any load, ensure that the slide lock has been moved back into the lifting position and that the bail is free to rotate (Figure 1).
- The Lifting Point can be loaded in any direction shown in Figure 4.
- Do not swivel the Lifting Point while supporting a load. The Lifting Point is a positioning device and is not intended to swivel under load.

To remove Lifting Point

- Move the slide lock into the installation position, such that the four flats on the bolt head flats are engaged (Figure 2).
- Unthread the Lifting Point from your workpiece.

Lifting Point Inspection / Maintenance

- Perform regular daily inspections as recommended.
- Always inspect Lifting Point before use.
- Regularly inspect Lifting Point parts (Figure 3).
- Never use Lifting Point that shows signs of corrosion, wear or damage.
- Never use Lifting Point if bail is bent or elongated.
- Always be sure threads on shank and receiving hole are clean, not damaged, and fit properly.
- Never use spacers (washers) between bushing flange and the mounting surface.
- Always ensure free movement of bail. The bail should swivel 360 degrees (Figure 3).
- Always be sure total workpiece surface is in contact with Lifting Point bushing mating surface. Drilled and tapped hole must be 90 degrees to load (workpiece) surface.

Table 1

Working Load Limit 4:1 (t)	UNC Bolt Size (in)	Effective Thread Projection Length (in)
.5	3/8	.61
.75	1/2	.80
1.50	5/8	1.01
2.30	3/4	1.28
2.30	7/8	1.63
3.20	1	1.93

Table 2

Working Load Limit 4:1 (t)	Metric Bolt Size (mm)	Effective Thread Projection Length (mm)
.5	10	14.7
.75	12	18.1
1.50	16	24.5
2.30	20	31.0
3.20	24	37.0

Figure 3

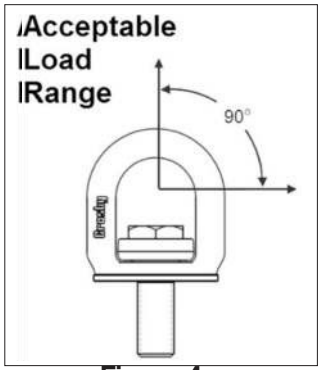


Figure 4

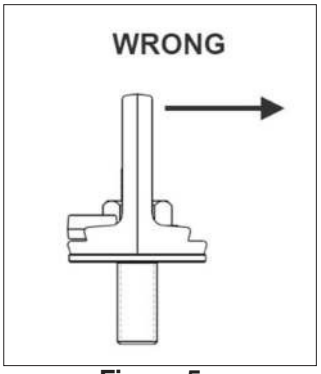


Figure 5

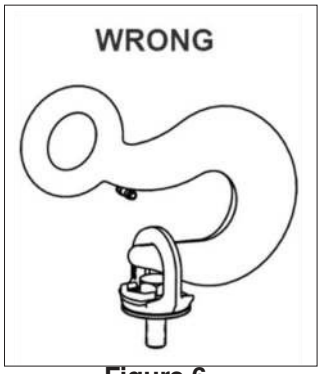
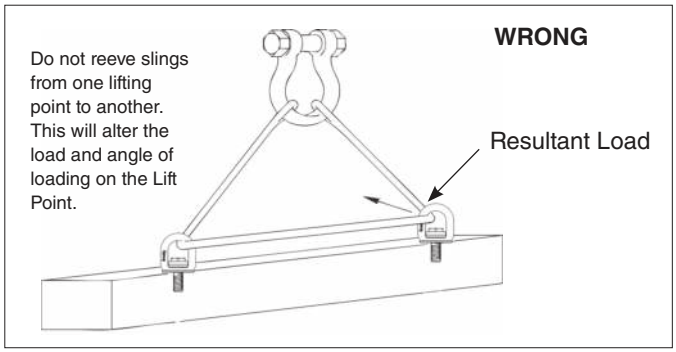
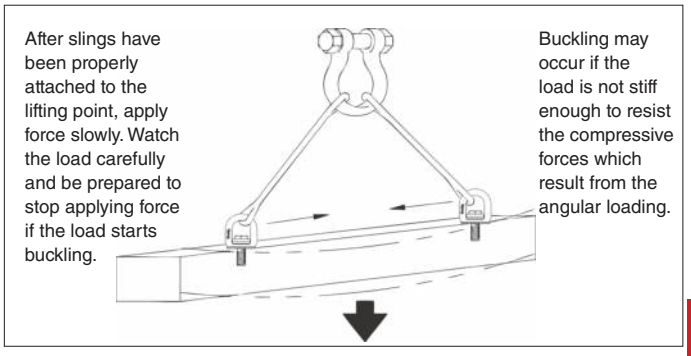


Figure 6





Technical Information

The following information aims to give advice and explain the most common questions in order to ensure correct and proper use of lifting points. This technical information refers to RELP, RLP, DLP and BLP unless other is stated. Always refer to the user instructions of the specific model of lifting point before use. It is of the most importance that this information is known to the user and in accordance with the Machinery Directive 2006/42/EC this information must be delivered to the customer. See website or user instructions for assembly instructions. Meets listed current specifications and standards at time of publication of this catalog.

General Advice

Reference should be made to relevant standards and other statutory regulations. Inspections must be carried out only by people who possess sufficient knowledge.

Before installation and before every use, visually inspect the lifting points, paying particular attention to any evidence of corrosion, wear, weld cracks or deformations. Please ensure compatibility of bolt thread and tapped hole.

The material construction, to which the lifting point will be attached, should be of adequate strength to withstand forces during lifting without deformation.

Ensure minimum thread depth, see table (d refers to bolt diameter).

Thread depth	Yield limit of base material
1 x d	For steel, yield limit >200 MPa
1.25 x d	For cast iron, yield limit >200MPa
2.5 x d	Aluminum
	For other metal alloys or base materials consult your Gunnebo Industries distributor.

- If the bolt length needs to be adjusted the bolt should be cut with a cold saw or lathe and temperature kept as low as possible during cutting. After cutting check the shape of the threads nearest the cut with an appropriately sized die (there must not be any burrs).
- The surface facing around the thread hole shall be flat (plane), clear of dirt and smooth to ensure perfect contact with the shoulder surface of the Lifting Point.

Nut and washer

The nut and washer must be the original equipment supplied from Gunnebo Industries to ensure the correct mechanical properties. No warranty, insurance or liability will be accepted if bolts not supplied by Gunnebo Industries have been used.

Extreme Environments

The in-service temperature affects the WLL as follows:

RLP

Temperature (°C)	Reduction of WLL
-40 to + 200 °C	0 %
+200 to + 300 °C	10 %
+300 to + 400 °C	25 %
Temperatures below -40°C or above 400 °C are not allowed.	

RELP

Temperature (°C)	Reduction of WLL
-40 to + 200 °C	0 %
+200 to + 300 °C	15 %
+300 to + 400 °C	20%
+250 to + 350 °C	25 %
Temperatures below -40°C or above 350°C are not allowed.	

BLP / DLP

Temperature (°C)	Reduction of WLL
-40 to + 200 °C	0 %
Temperatures below -40°C or above 200°C are not allowed.	

Severe Environments

Lifting points must not be used in alkaline (> pH10) or in acidic condition (< pH6).
Comprehensive and regular examination must be carried out when used in severe or corrosive environments. In uncertain situations consult your Gunnebo Industries distributor.

Surface Treatment

- Hot dip galvanizing or plating is not allowed outside the control of the manufacturer.
- Acid or Alkaline cleaning is not allowed.

Protect yourself and others

- Before each use the Lifting Point should be checked for obvious damage or deterioration.
- Know the weight of the load and its center of gravity.
- Ensure the load is ready to move and that no obstacles will obstruct the lifting.
- Check the conformity of the load with the Working Load Limit.
- Prepare the landing site.
- Never overload and avoid shock loading.
- Never use an improper configuration.
- Never use a worn or damaged Lifting Point.
- Do not ever ride on the load.
- Do not ever walk or stand under a suspended load.
- Take into consideration that the load may swing or rotate.
- Watch your feet and fingers while loading/unloading.

Inspection

Periodic thorough examination must be carried out at least every 12 months or more frequently according to local statutory regulations, type of use and past experience.

- Ensure correct bolt and nut size, quality and length.
- Ensure compatibility of bolt thread and tapped hole – control of the torque.
- The lifting point should be complete.
- The working load limit and manufacturers stamp should be clearly visible.
- Check for deformation of the component parts such as body, load ring and bolt.
- Check for mechanical damage, such as notches, particularly in high stress areas.
- Wear should be no more than 10 % of cross sectional diameter.
- Evidence of corrosion.
- Evidence of cracks.
- Damage to the bolt, nut and/or thread.
- The body of the Lifting Point must be free to rotate.

Symmetric Loading Conditions

- For three and four leg lifts, the Lifting Points should be arranged symmetrically around the center of gravity and in the same plane if possible.
- The WLL for Gunnebo Industries Lifting Points is based on symmetrical loading.
- The Lifting Point must be positioned on the load in such way that movement is avoided during lifting.
- For single leg lifts, the lifting point should be vertically above the center of gravity of the load.
- For two leg lifts, the Lifting Points must be equidistant to or above the center of gravity of the load.

Asymmetric Loading Conditions

- For unequally loaded lifts we recommend that the WLL is determined as follows:
- 2-leg slings are calculated as the corresponding 1-leg sling.
- 3 and 4-leg slings are calculated as the as the corresponding 1-leg sling*

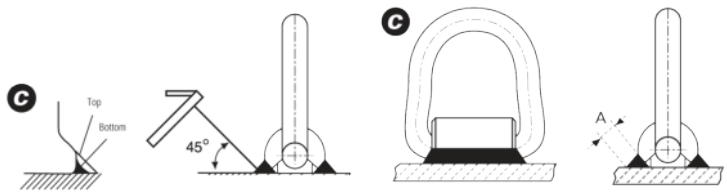
**(If 2-legs with full certainty are carrying the major part of the load, the WLL can be calculated as for the corresponding 2-leg sling).*

WLP - WELDING

Preheat the structure if the temperature is below 0°C; otherwise follow AS 1554 or other suitable national standard.

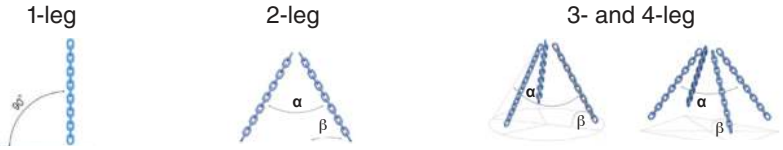
- Ensure that the WLP cannot move during welding by welding the corners of the welding block. Continue the weld around the welding block without interruption in a single operation.
- The nozzle or electrode should be at 45° (see Fig. C), so that the required penetration is obtained. The minimum throat (A) should be maintained.

Product	Min. plate gauge (Rm-1250 N/mm2) tmin (mm)	Min. throat thickness (mm)
WLP 2.5 T	11	11
WLP 4 T	19	13
WLP 7 T	24	16
WLP 10 T	30	18
WLP 16 T	40	20



- The weld should not contain cracks or pores.
- Do not cool the weld with water. It should be left to cool naturally.

Working Load Limits for WLP

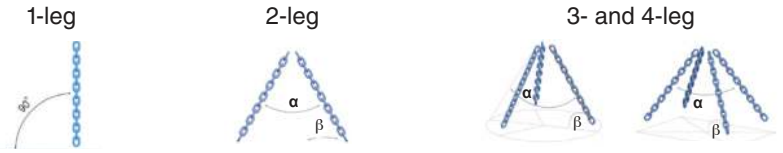


Typ	WLL tonnes*	α 0-90° β 0-45°	α 90-120° β 45-60°	α 0-90° β 0-45°	α 90-120° β 45-60°
WLP-2.5T	2.5	3.5	2.5	5.2	3.7
WLP-4T	4.0	5.6	4.0	8.4	6.0
WLP-7T	7.0	9.8	7.0	14.8	10.5
WLP-10T	10.0	14.1	10.0	21.2	15.0
WLP-16T	16.0	22.5	16.0	33.6	24.0

Working Load Limits for SLP

Typ	WLL tonnes*	α 0-90° β 0-45°	α 90-120° β 45-60°	α 0-90° β 0-45°	α 90-120° β 45-60°
SLP-1T	1.0	1.4	1.0	2.1	1.5
SLP-3T	3.0	4.2	3.0	6.3	4.5
SLP-5T	5.0	7.0	5.0	10.6	7.5

Working Load Limits for ELP



Typ	WLL tonnes*	α 0-90° β 0-45°	α 90-120° β 45-60°	α 0-90° β 0-45°	α 90-120° β 45-60°
ELP-16-8	1.0**	1.4	1.0	2.1	1.5
ELP-20-8	1.5**	2.1	1.5	3.1	2.3
ELP-24-8	2.0**	2.8	2.0	4.2	3.0
ELP-30-8	3.0**	4.2	3.0	6.3	4.5

Note: The above loads apply to normal usage and equally loaded legs. For asymmetric loaded chain slings, the following is recommended:

- A two-legged system is rated as a single-legged system.
- A three- or four-legged system is rated as a two-legged system.

** In case of 1-leg application where loading is limited to straight loading in the direction of thread (no bending force) it is possible to use ELP with four times higher WLL. Note: Threaded depths need to be at least 1xM for steel, 1.25xM for cast iron and 2xM for aluminum alloy.

Speedbinders TORQUE DRIVE LOAD BINDER

Warnings and Application Instructions

Speedbinders Torque Drive Load Binder

Important Safety Information - Read & Follow

For maximum safety and efficiency, load securement systems must be properly designed, used and maintained. You must understand the use of load binders in a load securement system. These instructions provide this knowledge. Read them carefully and completely.

⚠ WARNING

- **Failure to use this load binder properly may result in serious injury or even death to you or others.**
- **Do not operate load binder while standing on the load.**
- **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, the load binder must not be side loaded.**
- **Chain tension may decrease due to load shifting during transport.**
- **Do not throw these instructions away. Keep them close at hand and share them with any others who use this load binder.**
- **Care should be taken to reduce the speed of the drill as the chain becomes taut, to minimize the twist of the drill. It may be necessary to use both hands to secure the drill at high torque- even at slow speeds.**
- **Use only genuine Speedbinders parts as replacement.**

Instructions- Torque Drive Load Binder

- Position the Torque Drive load binder so it can be operated from the ground or a stable location. Be aware of ice, snow, rain, oil, etc. that can affect your footing. Make certain your footing is secure.
- Position the load binder with short portion of barrel close to the trailer attachment point, so the reaction bar rests against the floor of the trailer after tensioning. Alternately, position the reaction bar against the object being secured.

- Do not attempt to hold the reaction bar to prevent rotation while tensioning.
- Tension the Torque Drive binder using a rotation tool such as cordless drill equipped with a 14 mm socket. If the cordless drill is not available, a manual wrench or tool equipped with a 14 mm socket can be used to tighten or loosen.
- To tighten the load binder, the drill rotates the 14 mm hex head clockwise. Loosening is achieved by counterclockwise rotation of the 14 mm hex head.
- After tensioning, the reaction bar must be restrained to prevent barrel rotation and unintended loosening of the load binder.
- Cordless drills with approximately 800 Lb.- In. maximum torque output can be used and provide adequate tensioning for most load securement applications.
- Never exceed the Working Load Limit of the load binder.
- Do not use ½" or larger impact drivers, as the torque of these devices can damage the gears and over-tension the load securement system.
- After tensioning, it should take about 15– 20 pounds of force to pull the reaction bar away from the floor or secured object.
- Chain tension may change due to load shifting during transport. Ensure the load binder remains in proper position, and retighten as required.
- When releasing the load, be aware that the load may have shifted, and may have become unstable.

Inspection / Maintenance

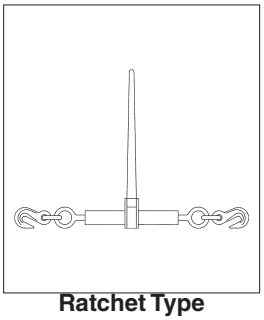
- Routinely check load binders for elongation, wear, bending, cracks, nicks, gouges or corrosion. **If bending or cracks are present – Do not use load binder.**
- Routinely (approximately every 30 cycles) grease the gear set through the grease fitting, using a medium consistency EP grease.
- Routinely clean and lubricate screw threads of load binder to extend product life and reduce friction wear.
- Inspect drive bolt head for any signs of wear.

Crosby® Load Binder

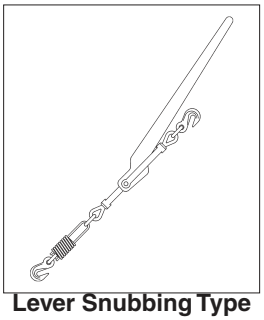
WARNINGS & APPLICATION INSTRUCTIONS

⚠ WARNING

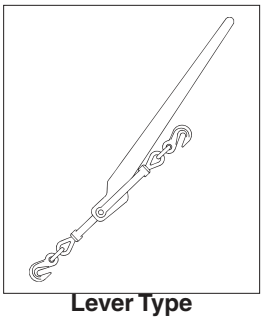
- **Failure to use this load binder properly may result in serious injury or even death to you or others.**
- **Do not operate load binder while standing on the load.**
- **Move handle with caution. It may whip – Keep body clear.**
- **Keep yourself out of the path of the moving handle and any loose chain laying on the 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 an object, as this will cause side load.**
- **Do not throw these instructions away. Keep them close at hand and share them with any others who use this load binder.**
- **Do not use handle extender – see instructions.**
- **Do not attempt to close or open the binder with more than one person.**



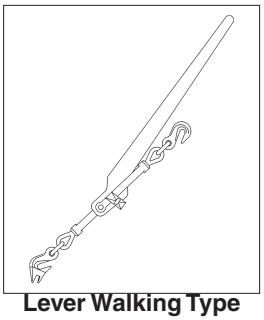
Ratchet Type



Lever Snubbing Type



Lever Type



Lever Walking Type

Mechanical Advantage

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

Example: 50 kilogrames of effort applied to the binder results in the following force on the binder.

Lever Type:
50kg. x 25 = 1250 kg of force

Ratchet Type:
50kg. x 25 = 2500 kg 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 LLC 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 visual wear 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.

This application/warning information apply to Crosby products only.

Crosby® L-180 WINCHLINE TAIL CHAIN

WARNING & APPLICATION INSTRUCTIONS

L-180

- **Loads may disengage from winchline tail chain if proper procedures are not followed.**
- **A falling load or disengaged winchline tail chain may cause serious injury or death.**
- **Inspect winchline tail chain for damage before each use.**
- **Wire rope should not be terminated to tail chain by the use of a knot.**
- **Do not attach slings or other devices in hook for overhead lifting – see operating practices.**

Important Safety Information – Read & Follow

- Only winchline tail chains made from alloy chain, Grade 80 or Grade 100, should be used for overhead lifting applications.
- Working Load Limit (WLL) is the maximum load in pounds which should ever be applied to winchline tail chain.
- The Working Load Limit or Design Factor may be affected by wear, misuse, overloading, corrosion, deformation, intentional alterations, sharp corner cutting action and other use conditions.
- Never repair, alter, rework, or reshape a hook or chain by welding, heating, burning or bending.
- Recommended for IPS or XIP (EIP), RRL, FC or IWRC wire rope.
- Shock loading and extraordinary conditions must be taken into account when selecting winchline tail chains.

CAUSE FOR REMOVAL FROM SERVICE

A winchline tail chain shall be removed from service if any of the following are visible on chain or hook:

- Wear, nicks, cracks, breaks, gouges, stretch, bend, weld splatter and discoloration from excessive temperature. Minimum thickness on chain link shall not be below the values listed on Table 1.
- Chain links and hook that do not hinge freely to adjacent links.
- Excessive pitting or corrosion on chain, hook or termination fitting.
- Makeshift fasteners, hooks, or links formed from bolts, rods, etc.

Table 1

L-180 Stock No.	Wire Rope Diameter (mm)	Nominal Chain Size (mm)	Nominal Chain Size (in)
1091482	13 - 16	16	5/8
1091511	19 - 22	22	7/8
1091516	25 - 29	26	1
1091525	25 - 29	26	1
1091532	32	32	1-1/4

- Mechanical coupling links in the body of the chain.
- Other damage that would cause a doubt as to the strength of the chain.
- Winchline tail chain should not be subjected to galvanizing or any plating process. If it is suspected the chain has been exposed to chemically active environment, remove from service.
- Termination end attachments that are cracked, deformed, or worn.
- For wire rope inspection procedures and removal from service criteria refer to manufacturer's recommendations.

OPERATING PRACTICES

- Know the winch lifting/pulling systems capacity rating.
- Know the applied load on tail chain. In dragging applications, the applied load may be greater or less than its weight due to friction.
- During lifting/dragging with or without the load, personnel should be alert for possible snagging.
- WORKING LOAD LIMIT (WLL) is the maximum load in pounds which should ever be applied to winchline tail chain when the chain is new or in as-new condition, and when the load is uniformly applied in direct tension to a straight length of chain.

Wire Rope Diameter (mm)	L-180 Stock No.	Working Load Limit 3.5 to 1 Design Factor (kg)
13 - 16	1091482	5900
19 - 22	1091511	15510
25 - 29	1091516	21640
25 - 29	1091525	21640
32	1091532	33200

10mm through 16mm made from Grade 40 High Test carbon steel.
22mm through 32mm made from Grade 80 or Grade 100 alloy steel. Only alloy tail chain should be used for overhead lifting applications.

- Wire rope termination efficiency and tail chain Working Load Limit (WLL) must be considered when selecting termination fitting and tail chain.
- Efficiency of wire rope end termination is based on the catalog breaking strength of wire rope.

Typical Termination Method & Efficiency	
Termination	Efficiency
S-409 Swage Button	80%

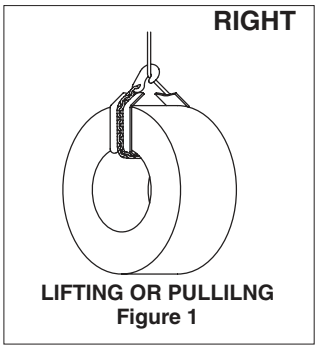
- The winchline tail chain hook is designed to fit the winchline diameter when hooked or connected back to winchline (See Figure 1).
- When used to pull or drag a load, the winchline tail chain may be wrapped around the load and the hook connected to the winchline. Also, when used to pull or drag a load over the tail board roller, the tail chain hook may be attached directly to the load at a connection point authorized by a competent rigger (See Figure 5). In either case, a visual verification of proper hook engagement is required during the entire operation.
- When used in overhead lifting applications, the winchline tail chain may be wrapped around the load and the hook connected to the winchline (See Figure 1). Used in this manner, this connection provides the same load control advantages and limitations as a single leg wire rope sling basket or choker hitch. The winchline tail chain should contain and support the load from the sides, above center of gravity, so load remains under control.

A visual verification of proper hook engagement is required during the entire operation.

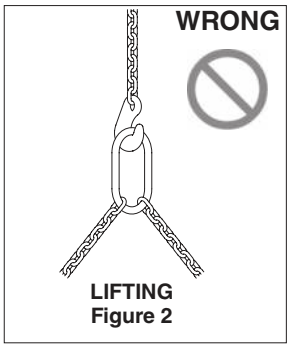
- The tail chain hook has no provision for a latch; therefore, The Crosby Group, LLC. specifically recommends AGAINST placing the load, slings or other devices directly into the tail chain hook for the purpose of overhead lifting. A latch may be mandatory by regulations or safety codes: e.g. OSHA, MSHA, ASME B30, insurance, etc (See Figure 2).

If the above Crosby recommendation is disregarded and slings or other devices are placed directly into the tail chain hook, as a minimum ensure:

  - Personnel shall stand clear of the suspended load.
  - Visual verification of proper hook engagement is required in all cases.
  - The sling or device should be centered in the base (bowl/ saddle) of the hook.
  - The user must assure connection to the hook is secure throughout the movement of the load.
  - A designated competent rigger must verify that all appropriate rigging practices are followed for attachment and control of load.
- The winchline and tail chain links should always be protected from being damaged by sharp corners (See Figure 3).
- Chain links should not be twisted or kinked.
- Winchline or tail chain should not be pulled from under loads if the load is resting on winchline or tail chain.
- Winchline or tail chain that appears to be damaged should not be used unless inspected and accepted by a designated person.
- Never side load, back load, or tip load hook (See Figure 4).
- All portions of the human body should be kept from between the winchline / tail chain and load.
- Personnel shall stand clear of the suspended load.
- Shock loading should be avoided.
- Extreme temperature will reduce the performance of winchline tailchain.
- Normal operating temperature is -40°F to 400°F (-40°C to 204°C).



LIFTING OR PULLILNG
Figure 1



LIFTING
Figure 2

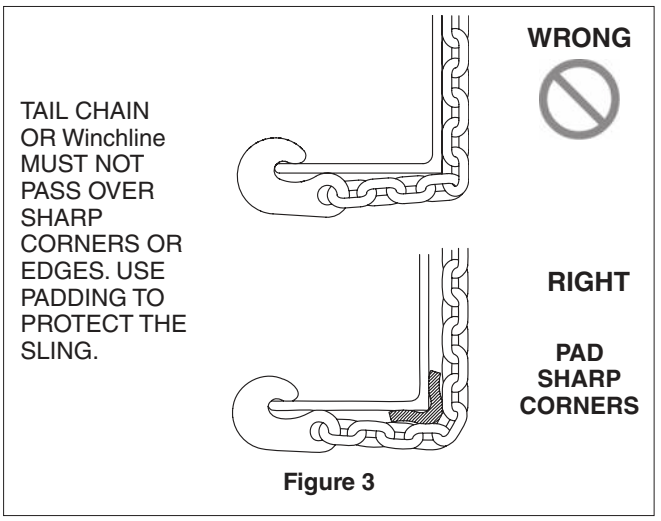


Figure 3

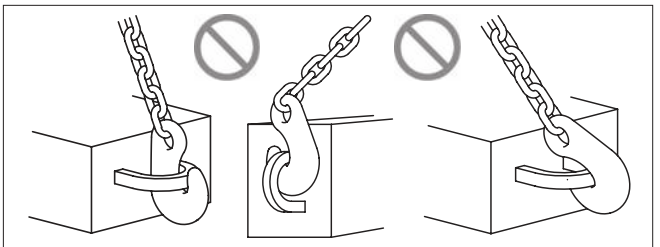


Figure 4

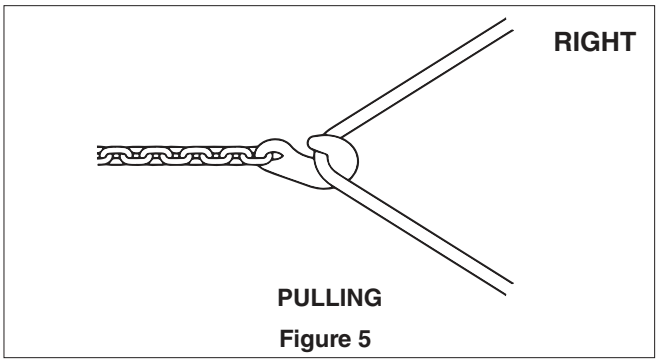


Figure 5

TACKLE BLOCK & SHEAVE ASSEMBLY

WARNINGS, USE AND MAINTENANCE INFORMATION

⚠ WARNING

- **A potential hazard exists when lifting or dragging heavy loads with tackle block assemblies.**
- **Failure to design and use tackle block systems properly may cause a load to slip or fall – the result could be serious injury or death.**
- **Failure to design lifting system with appropriate sheave assembly material for the intended application may cause premature sheave, bearing or Wireline wear and ultimate failure - the result could be serious injury or death.**
- **A tackle block system should be rigged by a qualified person as defined by ANSI/ASME B30.26.**
- **Instruct workers to keep hands and body away from block sheaves and swivels – and away from "pinch points" where rope touches block parts or loads.**
- **Do not side load tackle blocks.**
- **See OSHA Rule 1926.1431(g)(1)(i)(A) and 1926.1501(g)(4)(iv)(B) for personnel hoisting by cranes and derricks, and OSHA Directive CPL 2-1.36 — Interim Inspection Procedures During Communication Tower Construction Activities. Only a Crosby or McKissick Hook with a PL latch attached and secured with a bolt, nut and cotter pin (or toggle pin) or a PL-N latch attached and secured with toggle pin; or a Crosby hook with an S-4320 latch attached and secured with cotter pin or bolt, nut and pin; or a Crosby SHUR-LOC® Hook in the locked position may be used for any personnel hoisting. A hook with a Crosby SS-4055 latch attached shall NOT be used for personnel lifting.**
- **Instruct workers to be alert and to wear proper safety gear in areas where loads are moved or supported with tackle block systems.**
- **Use only genuine Crosby parts as replacement.**
- **Read, understand, and follow these instructions to select, use and maintain tackle block systems.**
- **Do not use a block or ball that does not have a legible capacity tag.**

Important:

For maximum safety and efficiency, tackle block and sheave systems must be properly designed, used, and maintained. You must understand the use of tackle block components and sheaves in the system. The responsibility for the use and application of products rests with the user. Read them carefully and completely.

Some parts of these instructions must use technical words and detailed explanations. NOTE: If you do not understand all words, diagrams, and definitions – **A block and system must be designed by a qualified person.** For further assistance, call:

In U.S.A. – Crosby Engineered Products Group at (800)777-1555.
In CANADA – Crosby Canada, Ltd. (877) 462-7672.
In EUROPE – N.V. Crosby Europe (+32)(0)15 75 71 25.

As you read instructions, pay particular attention to safety information in bold print.

KEEP INSTRUCTIONS FOR FUTURE USE – DO NOT THROW AWAY!

General Cautions or Warnings

Ratings shown in Crosby Group literature are applicable only to new or in "as new" products.

Working Load Limit ratings indicate the greatest force or load a product can carry under usual environmental conditions. Shock loading and extraordinary conditions must be taken into account when selecting products for use in tackle block systems. Working Load Limit ratings are based on all sheaves of tackle block system being utilized. If all sheaves are not utilized, balance must be maintained, and the Working Load Limit must be reduced proportionally to prevent overloading sheave components. Changes from full sheave reeving arrangement should be only at the recommendation of a qualified person, and incorporate good rigging practices.

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

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

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

Always make sure the hook supports the load. The latch must never support the load.

Welding of load supporting parts or products can be hazardous. Knowledge of materials, heat treatment, and welding procedures are necessary for proper welding. Crosby Group should be consulted for information.

Crane component parts, i.e., the boom, block, overhaul ball, swivel, and wire ropes are metallic and will conduct electricity. Read and understand OSHA standard covering crane and derrick operations (29 CFR 1926.1501 SUBPART N) before operating proximate to power lines.

Definitions

STATIC LOAD – The load resulting from a constantly applied force or load.

WORKING LOAD LIMIT – The maximum mass or force which the product is authorized to support in general service when the pull is applied in-line, unless noted otherwise, with respect to the center line of the product. This term is used interchangeably with the following terms.

1. WLL
2. Rated Load Value
3. SWL
4. Safe Working Load
5. Resultant Safe Working Load

WORKING LOAD – The maximum mass or force which the product is authorized to support in a particular service.

PROOF LOAD – The average force applied in the performance of a proof test; the average force to which a product may be subjected before deformation occurs.

PROOF TEST – A test applied to a product solely to determine non-conforming material or manufacturing defects.

ULTIMATE LOAD – The average load or force at which the product fails, or no longer supports the load.

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

DESIGN (SAFETY) FACTOR – An industry term denoting a product's theoretical reserve capability, usually computed by dividing the catalog Ultimate Load by the Working Load Limit. Generally expressed for blocks as a ratio of 4:1.

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

SHEAVE / SHEAVE BEARING ASSEMBLY – Purchased by O.E.M. or end user to be used in their block or lifting system design.

Fitting Maintenance

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

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

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

For detailed instructions on specific products, see the application and warning information for that product. Any greater reduction may necessitate a reduced Working Load Limit.

Any crack or deformation in a fitting is sufficient cause to withdraw the product from service.

Selection Guide

Some of the blocks shown in Crosby Group literature are named for their intended use and selection is routine. A few examples include the "Double Rig Trawl Block" used in the fishing industry, the "Well Loggers Block" used in the oil drilling industry, and the "Cargo Hoisting Block" used in the freighter boat industry and "Derrick and Tower Block" used for hoisting personnel. Others are more generally classified and have a variety of uses. They include snatch blocks, regular wood blocks, standard steel blocks, etc. For example, snatch blocks allow the line to be attached by opening up the block instead of threading the line through the block. This feature eliminates the use of rope guards and allows various line entrance and exit angles to change direction of the load. These angles determine the load on the block and/or the block fitting (See "Loads on Blocks."). Snatch blocks are intended for infrequent and intermittent use with slow line speeds.

A tackle block sheave assembly is one element of a system used to lift, change direction or drag a load. There are other elements in the system including the prime mover (hoist, winch, hand), supporting structure, power available, etc. All of these elements can influence the type of tackle block or sheave required. When selecting a block or sheave for the system in your specific application, you should consider the other elements as well as the features of the blocks and sheaves shown in Crosby Group literature.

To select a tackle block or sheave to fit your requirements, consider the following points:

1. Are there regulations which could affect your choice of blocks or sheaves, such as federal or state, OSHA, elevator safety, mine safety, maritime, insurance, etc.?
2. What is the weight of the load, including any dynamics of impacts that add to load value? You must know this to determine the minimum required Working Load Limit value of the block or load on sheave.
3. How many parts of line are required? This can be determined given the load to be lifted and the line pull you have available. As an alternative, you could calculate the line pull required with a given number of parts of line and a given load weight.
   (See "How to Figure Line Parts.")
4. What is the size of line to be used? Multiply the available line pull by the desired safety factor for Wireline to determine the minimum catalog Wireline breaking strength; consult a Wireline catalog for the corresponding grade and diameter of Wireline to match. You should also consider fatigue factors that affect Wireline life (See "Sheave Size & Wireline Strength").
5. What is the speed of the line? This will help you determine the type of sheave bearing necessary. There are several choices of bearings suitable for different applications, including:
   A. Common (Plain) Bore for very slow line speeds and very infrequent use (high bearing friction).
   B. Self Lubricating Bronze Bushings for slow line speeds and infrequent use (moderate bearing friction).
   C. Bronze Bushing with pressure lubrication for slow line speeds and more frequent use at greater loads (moderate bearing friction).
   D. Anti-friction Bearings for faster line speeds and more frequent use at greater loads (minimum bearing friction).
6. What type of fitting is required for your application? The selection may depend on whether the block will be traveling or stationary. Your choices include single or multiple hooks with or without throat latches and shackles, which are the most secured load attachment. You should also decide whether the fitting should be fixed, swivel or swivel with lock. If it is a swivel fitting, then selection of a thrust bearing may be necessary. There are plain fittings with no bearings for positioning at no load, bronze bushed fittings for infrequent and moderate load swiveling, and anti-friction bearing equipped fittings for frequent load swiveling.
7. How will the block be reeved and does it require a dead end becket? (See "The Reeving of Tackle Blocks.")
8. How will the block be reeved and does it require a dead end becket? (See "The Reeving of Tackle Blocks.")
9. If the block is to be a traveling block, what weight is required to overhaul the line? (See "How to Determine Overhaul Weights.")
10. What is the fleet angle of the Wireline? Line entrance and exit angles should be no more than 1-1/2 degrees.
11. How will the block or sheave be maintained? Do conditions in your application require special maintenance considerations? (See "Tackle Block and Sheave Maintenance," and "Fitting Maintenance.")
12. Reference current edition of "Wireline Users Manual" for additional sheave design and maintenance information.

Tackle Block and Sheave Maintenance

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

Inspection: As a minimum, the following points should be considered:

1. Wear on pins or axles, rope grooves, side plates, bushing or bearings, cases, trunnions, hook shanks, and fittings (See Fitting Maintenance). Excessive wear may be a cause to replace parts or remove block or sheave from service.
2. Deformation in side plates, pins and axles, fitting attachment points, trunnions, etc. Deformation can be caused by abusive service or overload and may be a cause to remove block or sheave from service.
3. Misalignment or wobble in sheaves.
4. Security of nuts, bolts, and other locking methods, especially after reassembly following a tear down inspection. Original securing method should be used; e.g., staking, set screw, cotter pin, cap screw.
5. Pins retained by snap rings should be checked for missing or loose rings.
6. Sheave pin nuts should be checked for proper positioning. Pins for tapered roller bearings should be tightened to remove all end play during sheave rotation. Pins for bronze bushings and straight roller bearings should have a running clearance of .031 inch per sheave of end play and should be adjusted accordingly.
7. Hook or shackle to swivel case clearance is set at .031 to .062 at the factory. Increased clearance can result from component wear. Clearance exceeding .12 to .18 should necessitate disassembly and further inspection.
8. Deformation or corrosion of hook and nut threads. Your block's hook may be fitted with the Crosby/McKissick Patented Split Nut. Refer to the Split Nut section for proper removal, inspection and installation procedures.
9. Loss of material due to corrosion or wear on external area of welded hook and nut may indicate thread corrosion or damage. If these conditions exist, remove from service or perform load test.
10. Surface condition and deformation of hook (See Fitting Maintenance and ASME B30.10.)
11. Welded side plates for weld corrosion or weld cracking.
12. Hook latch for deformation, proper fit and operation.
13. Remove from service any bushings with cracks on inside diameter or bushing end. Bushings that are cracked and/or extended beyond sheave hub are indications of bushing overload.

LUBRICATION: The frequency of lubrication depends upon frequency and period of product use as well as environmental conditions, which are contingent upon the user's good judgment. Assuming normal product use, the following schedule is suggested when using lithium-base grease of a medium consistency.

SHEAVE BEARINGS

Tapered Roller Bearings – Every 40 hours of continuous operation or every 30 days of intermittent operation.
Roller Bearings – Every 24 hours of continuous operation or every 14 days of intermittent operation.
Bronze Bushings – (Not Self Lubricated) – Every 8 hours of continuous operation or every 14 days of intermittent operation.
Self Lubricating Bronze Bushing – are for slow line speeds and infrequent use (moderate bearing friction). Frequent inspection is required to determine the condition of bushing.

HOOK BEARINGS

Anti Friction – Every 14 days for frequent swiveling; every 45 days for infrequent swiveling.
Bronze Thrust Bushing or No Bearing Every 16 hours for frequent swiveling; every 21 days for infrequent swiveling.

Tackle Block Maintenance also depends upon proper block selection (see "Loads on Blocks"), proper reeving (see "The Reeving of Tackle Blocks"), consideration of shock loads, side loading, and other adverse conditions.

Sheave Bearing Application Information

Sheaves in a system of blocks rotate at different rates of speed, and have different loads. When raising and lowering, the line tension is not equal throughout the system. Refer to "How to Figure Line Parts" in the Sheaves Section for assistance in determining lead line loads used for bushing or bearing selection.

BRONZE BUSHINGS

Bronze Bushings are used primarily for sheave applications using slow line speed, moderate load, and moderate use. The performance capability of a bearing is related to the bearing pressure and the bearing surface velocity by a relationship known as true PV (Maximum Pressure - Velocity Factor). The material properties of the Bronze Bushings furnished as standard in Crosby catalog sheaves are:

(BP) Maximum Bearing Pressure :4500 PSI
(BV) Maximum Velocity at Bearing :1200 FPM
(PV) Maximum Pressure Velocity Factor: 55000

(It should be noted that due to material property relations, the maximum BP times the maximum BV is NOT equal to the maximum PV.)

Formula for Calculating Bearing Pressure:

$$BP = \frac{\text{Line Pull x Angle Factor}}{\text{Shaft Size x Hub Width}}$$

Note: Angle Factor Multipliers listed in the Sheaves Section

Formula for Calculating Bearing Velocity:

$$BV = \frac{PV}{BP}$$

Formula for Calculating Line Speed:

$$\text{Line Speed} = \frac{\text{BV (Tread Diameter + Rope Diameter)}}{\text{Shaft Diameter}}$$

Calculations can be made to find the maximum allowable line speed for a given total sheave load. If the required line speed is greater than the maximum allowable line speed calculated, then increase the shaft size and/or the hub width and recalculate. Continue the process until the maximum allowable line speed is equal to or exceeds the required line speed.

Example

Using a 14 in. sheave (Stock # 917191; refer to Wireline sheave section of this Catalog for dimensions)with a 4,600 lbs line pull and an 80° angle between lines, determine maximum allowable line speed.

$$BP = \frac{\text{4,600 lbs x 1.53}}{\text{(Line pull) (Angle Factor)}} = \frac{}{\text{1.50 x 1.62}} = \text{2,896 PSI}$$

(Shaft Size) (Hub Width)

$$BV = \frac{\text{55,000 (PV Factor)}}{\text{2,896 (BP)}} = \text{19 FBM Allowable}$$

Line Speed =
[19 x (11.75 + .75)] ÷ 1.50 = 158.3 FPM ALLOWABLE
(BV) (Tread Dia. + Rope Size) ÷ (Shaft Dia.)

If the application required a line speed equal to 200 FPM, then another calculation would be necessary. Trying another 14 in. sheave (stock # 4104828) under the same loading conditions, the results are as follows:

BP = (4,600 lbs x 1.53) ÷ (2.75 x 2.31) = 1,108 PSI

BV = 55,000 ÷1,108 = 50 FPM

Line Speed =
[50 x (11.75 + .75)] ÷ 2.75 = 227.3 FPM ALLOWABLE

COMMON (PLAIN) BORE –
Very slow line speed, very infrequent use, low load.

ROLLER BEARING –
Faster line speeds, more frequent use, greater load. Refer to manufacturer's rating. Reference appropriate bearing manufacturer's catalog for proper bearing selection procedure.

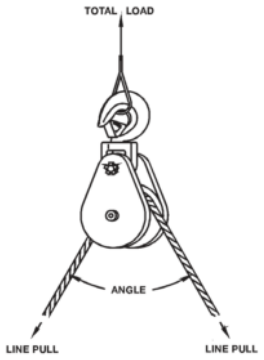
Loads on Blocks

The Working Load Limit (WLL) for Crosby Group blocks indicates the maximum load that should be exerted on the block and its connecting fitting.

This total load value may be different from the weight being lifted or pulled by a hoisting or hauling system. It is necessary to determine the total load being imposed on each block in the system to properly determine the rated capacity block to be used.

A single sheave block used to change load line direction can be subjected to total loads greatly different from the weight being lifted or pulled. The total load value varies with the angle between the incoming and departing lines to the block.

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

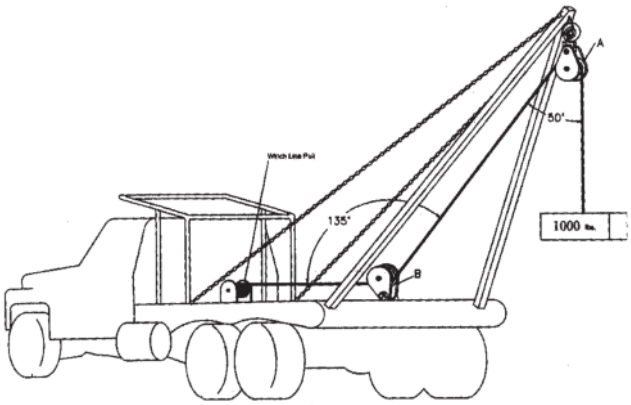


Angle Factor Multipliers			
Angle	**Factor**	**Angle**	**Factor**
0°	2.00	100°	1.29
10°	1.99	110°	1.15
20°	1.97	120°	1.00
30°	1.93	130°	.84
40°	1.87	135°	.76
45°	1.84	140°	.68
50°	1.81	150°	.52
60°	1.73	160°	.35
70°	1.64	170°	.17
80°	1.53	180°	.00
90°	1.41	—	—

Example A

(Calculations for determining total load value on single line system.)

A gin pole truck lifting 1,000 kg



There is no mechanical advantage to a single part load line system, so winch line pull is equal to 1,000 kg or the weight being lifted.

To determine total load on snatch block A:
A = 1,000 kg x 1.81 = 1,810 kg
(line pull) (factor 50° angle)

To determine total load on toggle block B:
B = 1,000 kg x .76 = 760 kg
(line pull) (factor 135° angle)

Example B
(Calculation for determining total load value for mechanical advantage system.)

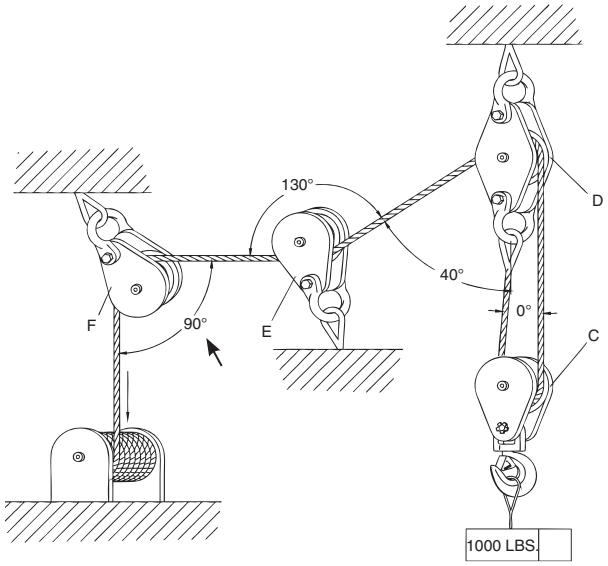
Hoisting system lifting 1,000 kg using a traveling block. The mechanical advantage of traveling block C is 2.00 because two (2) parts of load line support the 1,000 kg weight. (Note that this example is simplified for determination of resultant load on blocks. Lead line pull will be greater than shown due to efficiency losses.) (To determine single line pull for various bearing efficiency see "How to Figure Line Parts".)
To Determine Line Pull:
Line Pull = 1,000 kg ÷ 2.00 = 500 kg

To determine total load on traveling block C:
C = 500 kg x 2.0 = 1,000 kg.
(line pull)(Factor 0° angle)

To determine total load on stationary block D:
D = 500 kg x 1.87 + 500 kg = 1,435 kg
(line pull) (dead-end load)
(Factor 40° angle)

To determine total load on block E:
E = 500 kg x .84 = 420 kg
(line pull) (Factor 130° angle)

To determine total load on block F:
F = 500 kg x 1.41 = 705 kg
(line pull) (Factor 90° angle)



The Reeving of Tackle Blocks

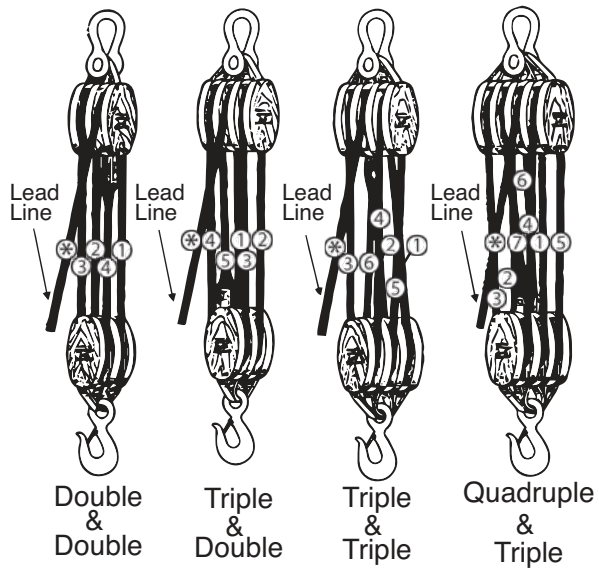
In reeving of tackle blocks, there are many methods. The method discussed below is referred to as "Right Angle" reeving. Please consult your rigging manual for other methods of reeving.

RIGHT ANGLE REEVING

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 to prevent toppling and avoid injury to the rope. 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 dead end of the rope. **Use a shackle block as the upper one of a pair and a hook block as the lower one as seen below.** Sheaves in a set of blocks revolve at different rates of speed. Those nearest the lead line revolve at the highest rate of speed and wear out more rapidly. All sheaves should be kept well lubricated when in operation to reduce friction and wear.

Reeving Diagram



⚠ CAUTION

- **Exercise care when block is standing in vertical position, as the potential for tipping exists. Potential causes of tipping are unstable work area, boom movement and the reeving process.**
- **If work area is unstable, lay block flat on side plate.**

17

Sheave Size & Wireline Strength

Strength Efficiency

Bending Wireline reduces its strength. To account for the effect of bend radius on Wireline strength when selecting a sheave, use the table below:

Ratio A	Strength Efficiency Compared to Catalog Strength in %
40	95
30	93
20	91
15	89
10	86
8	83
6	79
4	75
2	65
1	50

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

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

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

Refer to ratio A of 20 in the table then check the column under the heading "Strength Efficiency Compared to Catalog Strength in %"..91% strength efficiency as compared to the catalog strength of Wireline.

Fatigue Life

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

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

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

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

Example
To determine the extension of fatigue life for a 20mm Wireline using a 600mm diameter sheave versus a 320mm diameter sheave:

$$\text{Ratio B} = \frac{\text{600mm (sheave diameter)}}{\text{20mm (Wireline diameter)}} = 30$$

$$\text{Ratio B} = \frac{\text{320mm (sheave diameter)}}{\text{20mm (Wireline diameter)}} = 16$$

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

$$\text{Relative Fatigue Bending Life} = \frac{10}{2.1} = 4.7$$

Therefore, we expect extension of fatigue life using a 600mm diameter sheave to be 4.7 times greater than that of a 320mm diameter sheave.

How to Determine Overhauling Weights

To determine the weight of the block or overhaul ball that is required to free fall the block, the following information is needed: size of Wireline, number of line parts, type of sheave bearing, length of crane boom, and drum friction (use 25kg unless other information is available).

Wireline Size (in)	Factor A – Wireline Weight (lbs per ft) 6 x 19 IWRC
3/8	.26
7/16	.35
1/2	.46
9/16	.59
5/8	.72
3/4	1.04
7/8	1.42
1	1.85
1-1/8	2.34
1-1/4	2.89

Number of Line Parts	Factor B – Overhaul Factors	
	Roller Bearing Sheaves	Bronze Bushed Sheaves
1	1.03	1.05
2	2.07	2.15
3	3.15	3.28
4	4.25	4.48
5	5.38	5.72
6	6.54	7.03
7	7.73	8.39
8	8.94	9.80
9	10.20	11.30
10	11.50	12.80

The Formula is:

Required Block Weight = [(Boom Length x Factor A) + Drum Friction] x Factor B

Example:
To determine the required block or overhaul weight using 5 parts of 7/8" diameter Wireline, a 50 ft. boom and roller bearing sheaves:

Required Block Weight = [(50 ft. x 1.42) + 50 lbs.] x 5.38 = 651 lbs.
(Boom Length) (Drum Friction)
(Factor A) (Factor B)

How to Figure Line Parts

Sheaves in a system of blocks rotate at different rates of speed, and have different loads. When raising and lowering, the line tension is not equal throughout the system. 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, (for example, use Reeving Diagram on page 385. Only numbered lines shall be used in the calculation). The following ratio table is provided with examples of how to use it. The ratios are applicable for blocks as shown on page 385 and also independent sheave systems that line is reeved through.

Ratio A Bronze Bushed Sheaves	Ratio B Anti-Friction Bearing Sheaves	Number of Line Parts
.96	.98	1
1.87	1.94	2
2.75	2.88	3
3.59	3.81	4
4.39	4.71	5
5.16	5.60	6
5.90	6.47	7
6.60	7.32	8
7.27	8.16	9
7.91	8.98	10
8.52	9.79	11
9.11	10.60	12
9.68	11.40	13
10.20	12.10	14
10.70	12.90	15
11.20	13.60	16
11.70	14.30	17
12.20	15.00	18
12.60	15.70	19
13.00	16.40	20

Ratio A or B = Total Load to be Lifted / Single Line Pull (kg)

After calculating Ratio A or B, consult table to determine number of parts of line.

Examples:
To find the number of parts of line needed when weight of load and single line pull are known, and using Bronze Bushed Sheaves.

Ratio A = 72,180 kg (load to be lifted) / 8000 kg (single line pull) = 9.02 (Ratio A)

In table above refer to ratio 9.02 or next higher number, then check column under heading "Number of Line Parts" = 12 parts of line to be used for this load.

To find the single line pull needed when weight of load and number of parts of line are known, and using Anti-Friction Bearing Sheaves.

Single Line Pull = 68,000 kg (load to be lifted) / 7.32 (Ratio B of 8 part line = 9,290 kg

9,290 kg single line pull required to lift this load on 8 parts of line.

To find the lift capacity when the parts of line and single line pull are known, and using anti-friction bearing sheaves.

10,000 kg (Single line pull)
x 4.71 (Ratio B of 5 parts of line)
= 47.100 kg (Lift Capacity)

10,000 kg single line pull with 5 parts of line will accommodate 47.100 kg lift capacity.

Repairs

For repair of blocks, contact the following numbers for return material authorization.

IN U.S.A. – Crosby Engineered Products Group at (800) 777-1555

IN CANADA – Crosby Canada at (877) 462-4672

IN EUROPE – N.V. Crosby Europe at (+32) (0)15 75 71 25

Your block, after receipt by Crosby, will be inspected and a free estimate of repair charges will be provided. Authorization for repairs from block owners must be given to Crosby before repairs are made. Transportation charges, both to and from factory, are to be paid by the block owner.

INNOVATIVE MOORING SOLUTIONS, NOW FROM THE CROSBY GROUP

Crosby Feubo mooring components are manufactured using state-of-the-art technologies and processes, delivering quality, precision-engineered products for the offshore oil and gas and wind energy markets.

- Kenter links
- Anchor shackles
- Connectors
- H-Links
- Swivels
- Sockets
- Chasers
- KS Hooks
- Plates
- Bridles
- Plus more...

The world's first Grade R6 High Fatigue Life Kenter Link

For decades, The Crosby Group has developed products that exceed the toughest industry requirements. The new HFL NDur Link has been carefully designed and tested to offer the combination of the highest material grade and MBL strength definedfor offshore mooring connectors with the high fatigue life of the industry leading Crosby Feubo NDur Kenter.

The HFL NDur Link features the unique 'Fastlock' system that is proven to reduce project downtime and mitigate risk compared to conventional assembly and disassembly methods.

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Decimal and Metric Conversion Table

Fractional Equivalent (in.)	Decimal Equivalent (in.)	Metric Equivalent (mm)
1/64	.0156	.397
1/32	.0312	.794
3/64	.0469	1.191
1/16	.0625	1.588
5/64	.0781	1.984
3/32	.0938	2.381
7/64	.1094	2.778
1/8	.1250	3.175
9/64	.1406	3.572
5/32	.1562	3.969
11/64	.1719	4.366
3/16	.1875	4.762
13/64	.2031	5.159
7/32	.2188	5.556
15/64	.2344	5.953
1/4	.2500	6.350
17/64	.2656	6.747
9/32	.2812	7.144
19/64	.2969	7.541
5/16	.3125	7.938
21/64	.3281	8.334
11/32	.3438	8.731
23/64	.3594	9.128
3/8	.3750	9.525
25/64	.3906	9.922
13/32	.4062	10.319
27/64	.4219	10.716
7/16	.4375	11.112
29/64	.4531	11.509
15/32	.4688	11.906
31/64	.4844	12.303
1/2	.5000	12.700

Fractional Equivalent (in.)	Decimal Equivalent (in.)	Metric Equivalent (mm)
33/64	.5156	13.097
17/32	.5312	13.494
35/64	.5469	13.891
9/16	.5625	14.288
37/64	.5781	14.684
19/32	.5938	15.081
39/64	.6094	15.478
5/8	.6250	15.875
41/64	.6406	16.272
21/32	.6562	16.669
43/64	.6719	17.065
11/16	.6875	17.462
45/64	.7031	17.859
23/32	.7188	18.256
47/64	.7344	18.653
3/4	.7500	19.050
49/64	.7656	19.447
25/32	.7812	19.844
51/64	.7969	20.241
13/16	.8125	20.638
53/64	.8281	21.034
27/32	.8438	21.431
55/64	.8594	21.828
7/8	.8750	22.225
57/64	.8906	22.622
29/32	.9062	23.019
59/64	.9219	23.416
15/16	.9375	23.812
61/64	.9531	24.209
31/32	.9688	24.606
63/64	.9844	25.003
1	1.0000	25.400

Mass Conversions

To convert from U.S. tons to metric tons multiply by .907185

To convert from metric tons to U.S. tons multiply by 1.10231

To convert from metric tons to pounds multiply by 2204.62

To convert from metric tons to kilograms multiply by 1000

To convert from pounds to kilograms multiply by .453592

To convert from kilograms to pounds multiply by 2.20462

Temperature Conversion

To convert from degree Fahrenheit to degree Celsius use

Tc=5/9 (Tf-32)

To convert from degree Celsius to degree Fahrenheit use

Tf=9/5 (Tc)+32

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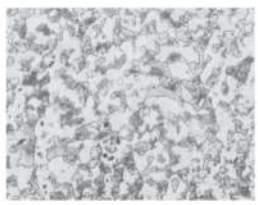
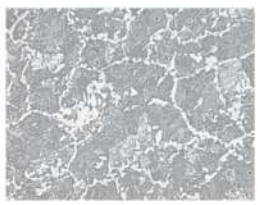
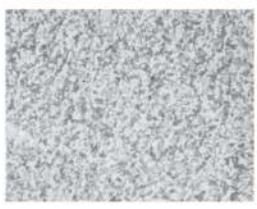


AS FORGED



NORMALIZED



QUENCHED & TEMPERED

Unretouched Photomicrographs (100x) of fitting

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