

WAC 296-56-60073 Miscellaneous auxiliary gear. (1) You must meet the following requirements for routine inspections:

(a) At the completion of each use, loose gear such as slings, chains, bridles, blocks, and hooks must be so placed as to avoid damage to the gear. Loose gear must be inspected and any defects corrected before reuse.

(b) All loose gear must be inspected by the employer or their authorized representative before each use and, when necessary, at intervals during its use, to ensure that it is safe. Any gear which is found upon inspection to be unsafe must not be used until it is made safe.

(c) Defective gear must not be used. Distorted hooks, shackles, or similar gear must be discarded.

(d) Chains or other gear which have been lengthened, altered, or repaired by welding must be properly heat treated, and before again being put into use, must be tested and reexamined in the manner set forth in WAC 296-56-60097 and 296-56-60098.

(2) You must maintain a record of the dates and results of the tests with each unit of gear concerned clearly identified. The records must be available for examination by division of consultation and compliance personnel and the employee safety committee.

(3) You must meet the following requirements for wire rope and wire rope slings:

(a) You must ascertain and adhere to the manufacturer's recommended ratings for wire rope and wire rope slings and must have such ratings available at the terminal. When the manufacturer is unable to supply such ratings, you must use the tables for wire rope and wire rope slings found in American National Safety Standard for Slings, ANSI/ASME B30.9-1984. A design safety factor of at least five must be maintained for the common sizes of running wire used as falls, in purchases or in such uses as light load slings. Wire rope with a safety factor of less than five may be used only:

(i) In specialized equipment, such as cranes designed to be used with lesser wire rope safety factors;

(ii) In accordance with design factors in standing rigging applications; or

(iii) For heavy lifts or other purposes for which a safety factor of five is impractical and for which the employer can demonstrate that equivalent safety is ensured.

(b) Wire rope or wire rope slings exhibiting any of the following conditions must not be used:

(i) Ten randomly distributed broken wires in one rope lay or three or more broken wires in one strand in one rope lay;

(ii) Kinking, crushing, bird caging, or other damage resulting in distortion of the wire rope structure;

(iii) Evidence of heat damage;

(iv) Excessive wear, corrosion, deformation or other defect in the wire or attachments, including cracks in attachments;

(v) Any indication of strand or wire slippage in end attachments; or

(vi) More than one broken wire in the close vicinity of a socket or swaged fitting.

(c) Four by twenty-nine (4 x 29) wire rope must not be used in any running rigging.

(d) Protruding ends of strands in splices on slings and bridles must be covered or blunted. Coverings must be removable so that spli-

ces can be examined. Means used to cover or blunt ends must not damage the wire.

(e) Where wire rope clips are used to form eyes, you must adhere to the manufacturer's recommendations, which must be available at the terminal. If "U" bolt clips are used and the manufacturer's recommendations are not available, Table C-1 must be used to determine the number and spacing of clips. "U" bolts must be applied with the "U" section in contact with the dead end of the rope.

**Table C-1
Number and Spacing of U-Bolt Wire Rope
Clips**

Improved plow steel, rope diameter	Minimum number of clips		Minimum spacing inches/(cm)
	Drop forged	Other material	
1/2 or less (1.3)	3	4	3 (7.6)
5/8 (1.6)	3	4	3 3/4 (9.5)
3/4 (1.9)	4	5	4 1/2 (11.4)
7/8 (2.2)	4	5	5 1/4 (13.3)
1 (2.5)	5	7	6 (15.2)
1 1/8 (2.9)	6	7	6 3/4 (17.1)
1 1/4 (3.2)	6	8	7 1/2 (19.1)
1 3/8 (3.5)	7	8	8 1/4 (21.0)
1 1/2 (3.8)	7	9	9 (22.9)

(f) Wire rope must not be secured by knots.

(g) Eyes in wire rope bridles, slings, bull wires, or in single parts used for hoisting must not be formed by wire rope clips or knots.

(h) Eye splices in wire ropes must have at least three tucks with a whole strand of the rope and two tucks with one-half of the wire cut from each strand. Other forms of splices or connections which are demonstrated to be equally safe may be used.

(i) Except for eye splices in the ends of wires and for endless rope slings, each wire rope used in hoisting or lowering, or in bulking cargo, must consist of one continuous piece without knot or splice.

(4) You must meet the following requirements for natural fiber rope.

(a) You must ascertain the manufacturer's ratings for the specific natural fiber rope used and have such ratings available at the terminal. The manufacturer's ratings must be adhered to and a minimum design safety factor of five maintained.

(b) Eye splices must consist of at least three full tucks. Short splices must consist of at least six full tucks, three on each side of the center line.

(5) You must meet the following requirements for synthetic rope:

(a) You must adhere to the manufacturer's ratings and use recommendations for the specific synthetic fiber rope used and must have such ratings available at the terminal.

(b) Unless otherwise recommended by the manufacturer, when synthetic fiber ropes are substituted for manila ropes of less than three inches (7.62 cm) circumference, the substitute must be of equal size. Where substituted for manila rope of three inches or more in circum-

ference, the size of the synthetic rope must be determined from the formula:

$$C = \sqrt{.6(C_s^2) + .4(C_m^2)}$$

Where C = the required circumference of the synthetic rope in inches, C_s = the circumference to the nearest one-quarter inch of a synthetic rope having a breaking strength not less than that of the size manila rope that would be required by subsection (4) of this section, and C_m = the circumference of manila rope in inches which would be required by subsection (4) of this section.

(c) In making such substitution, it must be ascertained that the inherent characteristics of the synthetic fiber are suitable for hoisting.

(6) You must remove natural or synthetic rope having any of the following defects from service:

- (a) Abnormal wear;
- (b) Powdered fiber between strands;
- (c) Sufficient cut or broken fibers to affect the capacity of the rope;
- (d) Variations in the size or roundness of strands;
- (e) Discolorations other than stains not associated with rope damage;
- (f) Rotting; or
- (g) Distortion or other damage to attached hardware.

(7) You must use properly fitting thimbles where any rope is secured permanently to a ring, shackle or attachment, where practical.

(8) You must meet the following requirements for synthetic web slings:

(a) Slings and nets or other combinations of more than one piece of synthetic webbing assembled and used as a single unit (synthetic web slings) must not be used to hoist loads in excess of the sling's rated capacity.

(b) Synthetic web slings must be removed from service if they exhibit any of the following defects:

- (i) Acid or caustic burns;
- (ii) Melting or charring of any part of the sling surface;
- (iii) Snags, punctures, tears or cuts;
- (iv) Broken or worn stitches;
- (v) Distortion or damage to fittings; or
- (vi) Display of visible warning threads or markers designed to indicate excessive wear or damage.

(c) Defective synthetic web slings removed from service must not be returned to service unless repaired by a sling manufacturer or similar entity. Each repaired sling must be proof tested by the repairer to twice the slings' rated capacity prior to its return to service. You must retain a certificate of the proof test and make it available for examination.

(d) Synthetic web slings provided by you must only be used in accordance with the manufacturer's recommendations, which must be made available upon request.

(e) Fittings must have a breaking strength at least equal to that of the sling to which they are attached and must be free of sharp edges.

(9) You must meet the following requirements for chains and chain slings used for hoisting.

(a) You must adhere to the manufacturer's recommended ratings for safe working loads for the sizes of the wrought iron and alloy steel chains and chain slings used and must have such ratings available. When the manufacturer is unable to provide such ratings, you must use the tables for chains and chain slings found in American National Safety Standard for Slings, ANSI B30.9-1971.

(b) Proof coil steel chain, also known as common or hardware chain, and other chain not recommended by the manufacturer for slinging or hoisting must not be used for slinging or hoisting.

(c) Sling chains, including end fastenings, must be inspected for visible defects before each day's use and as often as necessary during use to ensure integrity of the sling.

(i) Thorough inspections of chains in use must be made quarterly to detect wear, defective welds, deformation, increase in length or stretch. The month of inspection must be indicated on each chain by color of paint on a link or by other effective means.

(ii) Chains must be removed from service when maximum allowable wear, as indicated in Table C-2, is reached at any point of link.

(iii) Chain slings must be removed from service when stretch has increased the length of a measured section by more than five percent; when a link is bent, twisted or otherwise damaged; or when a link has a raised scarf or defective weld.

(iv) Only designated persons shall inspect chains used for slinging and hoisting.

**Table C-2
Maximum Allowable Wear at Any Point of Link**

Chain Size		Maximum Allowable Wear	
Inches	(cm)	Inches	(cm)
1/4 (9/32)	(0.6)	3/64	(0.1)
3/8	(1.0)	5/64	(0.2)
1/2	(1.3)	7/64	(0.3)
5/8	(1.6)	9/64	(0.4)
3/4	(1.9)	5/32	(0.4)
7/8	(2.2)	11/64	(0.4)
1	(2.5)	3/16	(0.5)
1 1/8	(2.9)	7/32	(0.6)
1 1/4	(3.2)	1/4	(0.6)
1 3/8	(3.5)	9/32	(0.7)
1 1/2	(3.8)	5/16	(0.8)
1 3/4	(4.4)	11/32	(0.9)

(d) Chains must only be repaired under qualified supervision. Links or portions of chain defective under any of the criteria under (c) of this subsection must be replaced with properly dimensioned links or connections of material similar to that of the original chain. Before repaired chains are returned to service, they must be tested to the proof test load recommended by the manufacturer for the original chain. Tests must be performed by the manufacturer or must be certified by an agency accredited for the purpose under WAC 296-56-60093. Test certificates must be available at the terminal.

(e) Wrought iron chains in constant use must be annealed or normalized at intervals not exceeding six months. Heat treatment certifi-

cates must be available at the terminal. Alloy chains must not be annealed.

(f) Kinked or knotted chains must not be used for lifting. Chains must not be shortened by bolting, wiring or knotting. Makeshift links or fasteners such as wire, bolts or rods must not be used.

(g) Hooks, rings, links and attachments affixed to sling chains must have rated capacities at least equal to that of the chains to which they are attached.

(h) Chain slings must bear identification of size, grade and rated capacity.

(10) You must meet the following requirements for shackles:

(a) If available, the manufacturer's recommended safe working loads for shackles must not be exceeded. In the absence of manufacturer's recommendations, Table C-3 must apply.





(b) Screw pin shackles used aloft in house fall or other gear, except in cargo hook assemblies, must have their pins moused or otherwise effectively secured.

**Table C-3
Safe Working Loads for Shackles**

Material Size		Pin Diameter		Safe Working Load in 2,000 lb Tons
Inches	(cm)	Inches	(cm)	
1/2	(1.3)	5/8	(1.6)	1.4
5/8	(1.6)	3/4	(1.9)	2.2
3/4	(1.9)	7/8	(2.2)	3.2
7/8	(2.2)	1	(2.5)	4.3
1	(2.5)	1 1/8	(2.9)	5.6
1 1/8	(2.9)	1 1/4	(3.2)	6.7
1 1/4	(3.2)	1 3/8	(3.5)	8.2
1 3/8	(3.5)	1 1/2	(3.8)	10.0
1 1/2	(3.8)	1 5/8	(4.1)	11.9
1 3/4	(4.4)	2	(5.1)	16.2
2	(5.1)	2 1/4	(5.7)	21.2

(c) Tables G-2 through G-5 must be used to determine the safe working loads of various sizes and classifications of improved plow steel wire rope slings with various types of terminals. For sizes, classifications and grades not included in these tables the safe working load recommended by the manufacturer for specific, identifiable products must be followed, however, a safety factor of not less than five must be maintained.

**TABLE G-1
MANILA ROPE
In Pounds or Tons of 2,000 Pounds**

Circumference	Diameter in Inches	Single Leg	60 Degree	45 Degree	30 Degree
					
		Lbs.	Lbs.	Lbs.	Lbs.
3/4	1/4	120	204	170	120
1	5/16	200	346	282	200
1 1/8	3/8	270	467	380	270
1 1/4	7/16	350	605	493	350
1 3/8	15/32	450	775	635	450





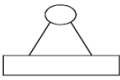
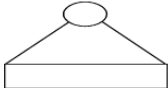
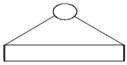
Circumference	Diameter in Inches	Single Leg	60 Degree	45 Degree	30 Degree
					
		Lbs.	Lbs.	Lbs.	Lbs.
1 1/2	1/2	530	915	798	530
1 3/4	9/16	690	1190	973	690
2	5/8	880	1520	1240	880
2 1/4	3/4	1080	1870	1520	1080
2 1/2	13/16	1300	2250	1830	1300
2 3/4	7/8	1540	2660	2170	1540
3	1	1800	3120	2540	1800
		Tons	Tons	Tons	Tons
3 1/4	1 1/16	1.0	1.7	1.4	1.0
3 1/2	1 1/8	1.2	2.1	1.7	1.2
3 3/4	1 1/4	1.35	2.3	1.9	1.35
4	1 5/16	1.5	2.6	2.1	1.5
4 1/2	1 1/2	1.8	3.1	2.5	1.8
5	1 5/8	2.25	3.9	3.2	2.25
5 1/2	1 3/4	2.6	4.5	3.7	2.6
6	2	3.1	5.4	4.4	3.1
6 1/2	2 1/8	3.6	6.2	5.1	3.6

TABLE G-2
RATED CAPACITIES FOR IMPROVED PLOW STEEL, INDEPENDENT
WIRE ROPE CORE, WIRE ROPE AND WIRE SLINGS
(In Tons of 2,000 Pounds)

Rope Diameter Inches	Single Leg					
	Vertical			Choker		
	A	B	C	A	B	C
6 x 19 Classification						
1/4"	.59	.56	.53	.44	.42	.40
3/8"	1.3	1.2	1.1	.98	.93	.86
1/2"	2.3	2.2	2.0	1.7	1.6	1.5
5/8"	3.6	3.4	3.0	2.7	2.5	2.2
3/4"	5.1	4.9	4.2	3.8	3.6	3.1
7/8"	6.9	6.6	5.5	5.2	4.9	4.1
1"	9.0	8.5	7.2	6.7	6.4	5.4
1 1/8"	11	10	9.0	8.5	7.8	6.8
6 x 37 Classification						
1 1/4"	13	12	10	9.9	9.2	7.9
1 3/8"	16	15	13	12	11	9.6
1 1/2"	19	17	15	14	13	11
1 3/4"	26	24	20	19	18	15
2"	33	30	26	25	23	20
2 1/4"	41	38	33	31	29	25
(A) — Socket or Swaged Terminal Attachment. (B) — Mechanical Sleeve Attachment. (C) — Hand Tucked Splice Attachment.						

TABLE G-3

RATED CAPACITIES FOR IMPROVED PLOW STEEL, INDEPENDENT WIRE ROPE CORE, WIRE ROPE SLING (IN TONS OF 2,000 POUNDS)

Two-leg bridle or basket hitch												
Rope dia. inches	Vertical			60 Degree 			45 Degree 			30 Degree 		
	A	B	C	A	B	C	A	B	C	A	B	C
6 x 19 Classification												
1/4"	1.2	1.1	1.0	1.0	.97	.92	.83	.79	.75	.59	.56	.53
3/8"	2.6	2.5	2.3	2.3	2.1	2.0	1.8	1.8	1.6	1.3	1.2	1.1
1/2"	4.6	4.4	3.9	4.0	3.8	3.4	3.2	3.1	2.8	2.3	2.2	2.0
5/8"	7.2	6.8	6.0	6.2	5.9	5.2	5.1	4.8	4.2	3.6	3.4	3.0
3/4"	10	9.7	8.4	8.9	8.4	7.3	7.2	6.9	5.9	5.1	4.9	4.2
7/8"	14	13	11	12	11	9.6	9.8	9.3	7.8	6.9	6.6	5.5
1"	18	17	14	15	15	12	13	12	10	9.0	8.5	7.2
1 1/8"	23	21	18	19	18	16	16	15	13	11	10	9.0
6 x 37 Classification												
1 1/4"	26	24	21	23	21	18	19	17	15	13	12	10
1 3/8"	32	29	25	28	25	22	22	21	18	16	15	13
1 1/2"	38	35	30	33	30	26	27	25	21	19	17	15
1 3/4"	51	47	41	44	41	35	36	33	29	26	24	20
2"	66	61	53	57	53	46	47	43	37	33	30	26
2 1/4"	83	76	66	72	66	57	58	54	47	41	38	33

(A) Socket or Swaged Terminal Attachment.
 (B) Mechanical Sleeve Attachment.
 (C) Hand Tucked Splice Attachment.

**TABLE G-4
 RATED CAPACITIES FOR IMPROVED PLOW STEEL, FIBER CORE,
 WIRE ROPE AND WIRE ROPE SLINGS
 (In Tons of 2,000 pounds)**

Rope dia. Inches	Single leg					
	Vertical			Choker		
	A	B	C	A	B	C
6 x 19 Classification						
1/4"	.55	.51	.49	.41	.38	.37
3/8"	1.2	1.1	1.1	.91	.85	.80
1/2"	2.1	2.0	1.8	1.6	1.5	1.4
5/8"	3.3	3.1	2.8	2.5	2.3	2.1
3/4"	4.8	4.4	3.9	3.6	3.3	2.9
7/8"	6.4	5.9	5.1	4.8	4.5	3.9
1"	8.4	7.7	6.7	6.3	5.8	5.0
1 1/8"	10	9.5	8.4	7.9	7.1	6.3
6 x 37 Classification						
1 1/4"	12	11	9.8	9.2	8.3	7.4
1 3/8"	15	13	12	11	10	8.9
1 1/2"	17	16	14	13	12	10
1 3/4"	24	21	19	18	16	14

Rope dia. Inches	Single leg					
	Vertical			Choker		
	A	B	C	A	B	C
2"	31	28	25	23	21	18

(A) — Socket or Swaged Terminal Attachment.
(B) — Mechanical Sleeve Attachment.
(C) — Hand Tucked Splice Attachment.

TABLE G-5
RATED CAPACITIES FOR IMPROVED PLOW STEEL, FIBER CORE, WIRE ROPE SLINGS
(IN TONS OF 2,000 POUNDS)

Rope dia. inches	Two-leg bridle or basket hitch											
	Vertical			60 Degree			45 Degree			30 Degree		
	A	B	C	A	B	C	A	B	C	A	B	C
	6 x 19 Classification											
1/4"	1.1	1.0	.99	.95	.88	.85	.77	.72	.70	.55	.51	.49
3/8"	2.4	2.2	2.1	2.1	1.9	1.8	1.7	1.6	1.5	1.2	1.1	1.1
1/2"	4.3	3.9	3.7	3.7	3.4	3.2	3.0	2.8	2.6	2.1	2.0	1.8
5/8"	6.7	6.2	5.6	5.8	5.3	4.8	4.7	4.4	4.0	3.3	3.1	2.8
3/4"	9.5	8.8	7.8	8.2	7.6	6.8	6.7	6.2	5.5	4.8	4.4	3.9
7/8"	13	12	10	11	10	8.9	9.1	8.4	7.3	6.4	5.9	5.1
1"	17	15	13	14	13	11	12	11	9.4	8.4	7.7	6.7
1 1/2"	21	19	17	18	16	14	15	13	12	10	9.5	8.4
	6 x 37 Classification											
1 1/4"	25	22	20	21	19	17	17	16	14	12	11	9.8
1 3/8"	30	27	24	26	23	20	21	19	17	15	13	12
1 1/2"	35	32	28	30	27	24	25	22	20	17	16	14
1 3/4"	48	43	38	41	37	33	34	30	27	24	21	19
2"	62	55	49	53	48	43	43	39	35	31	28	25

(A) Socket or Swaged Terminal Attachment.
(B) Mechanical Sleeve Attachment.
(C) Hand Tucked Splice Attachment.

TABLE G-6
ALLOY STEEL CHAIN
(In Tons of 2,000 Pounds)

Nominal Size Chain Stock Inch	Single Leg	60 Degree	45 Degree	30 Degree
1/4	1.62	2.82	2.27	1.62
3/8	3.30	5.70	4.65	3.30
1/2	5.62	9.75	7.90	5.62
5/8	8.25	14.25	11.65	8.25
3/4	11.5	19.9	16.2	11.5
7/8	14.3	24.9	20.3	14.3
1	19.3	33.5	27.3	19.8

Nominal Size Chain Stock Inch	Single Leg	60 Degree	45 Degree	30 Degree
1 1/8	22.2	38.5	31.5	22.2
1 1/4	28.7	49.7	40.5	28.7
1 3/8	33.5	58.0	47.0	33.5
1 1/2	39.7	68.5	56.0	39.7
1 5/8	42.5	73.5	59.5	42.5
1 3/4	47.0	81.5	62.0	47.0

(11) You must meet the following requirements for hooks other than hand hooks:

(a) The manufacturer's recommendations must be followed in determining the safe working loads of the various sizes and types of specific and identifiable hooks. All hooks for which no applicable manufacturer's recommendations are available must be tested to twice the intended safe working load before they are initially put into use. You must maintain a record of the dates and results of such tests.

(b) Loads must be applied to the throat of the hook since loading the point may overstress, bend, or spring the hook.

(c) Hooks must be inspected once a month to see that they have not been bent by overloading. Bent or sprung hooks must not be used.

(d) For crane hooks, magnetic particle or other suitable crack detecting inspection must be performed at least once each year. When testing by X-ray, the pertinent provisions of the Nuclear Regulatory Commission's standards for protection against radiation, relating to protection against occupational radiation exposure, must apply.

(e) Any activity which involves the use of radioactive materials or X-rays, whether or not under license from the Nuclear Regulatory Commission, must be performed by competent persons specially trained in the proper and safe operation of such equipment. In the case of materials used under commission license, only persons actually licensed, or competent persons under direction and supervision of the licensee, must perform such work.

(f) Teeth of case hooks must not be split, cracked, or deformed.

(g) Jaws of patent clamp type plate hooks must be kept in safe condition so that they will grip plates securely.

(12) You must meet the following requirements for pallets:

(a) Pallets must be made and maintained to safely support and carry loads being handled. Fastenings of reusable pallets used for hoisting must be bolts and nuts, drive screws (helically threaded nails), annular threaded nails or fastenings of equivalent holding strength.

(b) Damaged pallets must be stored in designated areas and identified.

(c) Reusable wing or lip-type pallets must be hoisted by bar bridles or other suitable gear and must have an overhanging wing or lip of at least three inches (7.62 cm). They must not be hoisted by wire slings alone.

(d) Loaded pallets that do not meet the requirements of this subsection (12)(d) must be hoisted only after being placed on pallets meeting such requirements or must be handled by other means providing equivalent protection.

(e) Bridles for handling flush end or box-type pallets must be designed to prevent disengagement from the pallet under load.

(f) Pallets must be stacked or placed to prevent falling, collapsing or otherwise causing a hazard under standard operating conditions.

(g) Disposable pallets intended only for one use must not be reused for hoisting.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, 49.17.060. WSR 15-24-102, § 296-56-60073, filed 12/1/15, effective 1/5/16. Statutory Authority: RCW 49.17.010, [49.17].040, and [49.17].050. WSR 00-21-103, § 296-56-60073, filed 10/18/00, effective 2/1/01. Statutory Authority: RCW 49.17.040. WSR 99-02-024, § 296-56-60073, filed 12/30/98, effective 3/30/99. Statutory Authority: Chapter 49.17 RCW. WSR 95-04-007, § 296-56-60073, filed 1/18/95, effective 3/1/95. Statutory Authority: Chapter 49.17 RCW and RCW 49.17.040, [49.17].050 and [49.17].060. WSR 92-22-067 (Order 92-06), § 296-56-60073, filed 10/30/92, effective 12/8/92. Statutory Authority: Chapter 49.17 RCW. WSR 91-11-070 (Order 91-01), § 296-56-60073, filed 5/20/91, effective 6/20/91. Statutory Authority: RCW 49.17.040 and 49.17.050. WSR 86-03-064 (Order 86-02), § 296-56-60073, filed 1/17/86; WSR 85-10-004 (Order 85-09), § 296-56-60073, filed 4/19/85; WSR 85-01-022 (Order 84-24), § 296-56-60073, filed 12/11/84.]