ETS LLC

EQUIPMENT TRAINING SOLUTIONS

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RIGGER SAFETY TRAINING PREP COURSE

STUDENT GUIDE

REVIEW QUESTIONS

Review Questions

1. According to OSHA, slings used in a basket hitch shall have the loads _____ to prevent slippage.
    a. suspended
    b. static
    c. balanced
    d. weighed

2. When slings encounter sharp edges on loads to be lifted, riggers shall ensure that slings are:
    a. Protected or padded
    b. Kinked or knotted
    c. Lengthened or shortened
    d. Damaged or defective

3. According to ASME B30.9, what is the maximum width of an object that can be placed in the eye of a wire rope sling?
    a. ¼ the length
    b. Same as the length
    c. ½ the length
    d. ¾ the length

4. According to OSHA, each day before being used, the sling and all fastenings and attachments shall be inspected for damage or defects by a:
    a. competent person.
    b. assigned person.
    c. designated person.
    d. certified person.

5. According to OSHA, alloy steel chain, wire rope, metal mesh and synthetic web slings shall not be used with loads in excess of their _____ .
    a. net capacity.
    b. rated capacity.
    c. machine capacity.
    d. hoist capacity.

6. According to OSHA, how many randomly distributed broken wires in one rope lay must there be to remove the wire rope sling from service?
    a. Three
    b. Five
    c. Seven
    d. Ten

7. According to OSHA, how many broken wires in one strand in one rope lay must there be to remove the rope from service?
    a. Five
    b. Four
    c. Three
    d. Two

8. Which knot is best for tying a tagline to the eye of a sling?
    a. Half Hitch
    b. Square Knot
    c. Sheet Bend
    d. Bowline

9. Referring to the rigger reference booklet, what is the work load limit of a wide body shackle with a pin diameter of 2.00 inches?
    a. 30 tons
    b. 55 tons.
    c. 40 tons.
    d. 75 tons.

10. How many randomly broken wires in six rope diameters are needed to meet the removal criteria for overhead hoists?
    a. 12
    b. 6
    c. 5
    d. 3

11. According to ASME, quadruple sling bridle ratings are the same as:
    a. triple sling bridle ratings.
    b. double sling bridle ratings.
    c. single sling bridle ratings.
    d. quadruple bridle ratings.

12. According to ASME B30.10, markings shall be forged, cast or die stamped on what area of the hook?
    a. Bowl and tip.
    b. Non-wearing.
    c. Latch and spring.
    d. High stress.

13. Referring to the rigger reference booklet, what is the capacity of a 7/8 inch grade 80 alloy chain sling using a vertical hitch?
    a. 27,360 lbs.
    b. 34,200 lbs.
    c. 42,700, lbs.
    d. 61,100 lbs.

14. Is an overhead hoist permitted to continue operation when its wire rope reaches any one of the removal criteria's?
    a. Yes, until the end of the shift with the approval of a qualified person.
    b. Yes, until the end of the day with the approval of a qualified person.
    c. Yes, until replacement rope is ready for installation.
    d. No, operation must stop immediately.

15. According to ASME B30.10, any hook that has any visible bend or twist from the plane of the unbent hook shall be:
    a. replaced.
    b. lubricated.
    c. tested.
    d. torched.

16. According to ASME B30.10, any hook having distortion causing an increase in throat opening of 5 percent or exceeding ¼ inch, shall be:
    a. left alone.
    b. certified.
    c. re-inspected.
    d. replaced.

17. According to ASME B30.10, any hook having **wear** exceeding _____% shall be removed from service.
    a. 4%
    b. 6%
    c. 8%
    d. 10%

18. According to OSHA, how often shall rigging equipment used in material handling be inspected?
    a. Each month
    b. Each week
    c. Prior to use each day
    d. Prior to use each shift

19. According to OSHA, natural and synthetic fiber rope slings shall be removed from service when_____.
    a. powdered fiber between strands are present
    b. ID tag is attached to the sling
    c. used in temperature exceeding 125^0
    d. All of the above

20. When correctly installing U-bolt type wire rope clips, the U-bolt portion of the clip must be installed on which end of the wire rope?
    a. The dead or short end.
    b. The live or long end.
    c. Installed on either end.
    d. Alternating each clip.

21. According to ASME B30.26, compression hardware shall be removed from service if which of the following are visible?
    a. Missing or illegible identification
    b. Excessive pitting or corrosion
    c. Bent, twisted, distorted, stretched or cracked components
    d. All of the above

22. According to ASME B30.9, what minimum grade alloy steel chain shall be used for hoisting chain?
    a. 80
    b. 60
    c. 40
    d. 20

23. According to ASME, which of the following statements is correct?
    a. As horizontal load angle increases, stress increases.
    b. As horizontal load angle decreases, stress decreases.
    c. As horizontal load angle decreases, stress increases.
    d. All of the above.

24. According to ASME B30.9, to achieve load stability when lifting, the attachment points should be?
    a. below the center of gravity
    b. above the center of gravity
    c. anywhere on the load
    d. cannot be achieved

25. According to B30.26, a visual inspection of rigging hardware used in material handling shall be performed:
    a. Each month.
    b. Each week.
    c. Each day prior to use.
    d. Each shift prior to use.

26. Referring to the rigger reference booklet, what would be the rated capacity of a size 4 polyester round sling using a choker hitch?
    a. 6,700 pounds
    b. 8,500 pounds
    c. 10,600 pounds
    d. 13,200 pounds

27. According to ASME B30.9, the frequency of periodic inspections shall not exceed:
    a. 6 months
    b. 1 year
    c. 18 months
    d. 2 years

28. According to ASME B30.16, the three general classifications for inspections are as follows:
    a. Frequent, monthly and periodic.
    b. Shift, monthly and annual.
    c. Frequent, periodic and annual.
    d. Pre-operation, frequent and periodic

29. Referring to the rigger reference booklet, what is the capacity of a Dual- Path 17500 high capacity roundsling using a choker hitch?
    a. 140,000 pounds
    b. 130,000 pounds
    c. 120,000 pounds
    d. 110,000 pounds

30. According to ASME B30.26, if the shackle is to be side loaded, the rated load shall be reduced according to the recommendations of which person listed below?
    a. appointed
    b. designated
    c. qualified
    d. assigned

31. According to ASME B30.9, what is the maximum width of an object that can be placed in the eye of a synthetic web sling?
    a. ¼ the length
    b. ⅓ the length
    c. ½ the length
    d. ¾ the length

32. According to OSHA, which of the conditions listed below will prohibit the use of synthetic web slings?
    a. heavy loads
    b. acid and caustic vapors
    c. strong winds
    d. heating and air-conditioning vapors

33. According to ASME B30.9, the design factor for Synthetic Web, Synthetic Rope, Synthetic Round, Metal Mesh, and Wire Rope slings shall be a minimum of?
    a. 2.5
    b. 3.5
    c. 4
    d. 5

34. According to ASME B30.9, who should maintain the identification tags on wire rope slings?
    a. Manufacturer.
    b. User.
    c. Employer.
    d. Employee.

35. When using wire rope slings, the approximate percentage of strength of choker, vertical, and basket hitches respectively are:
    a. 50%, 75%, 100%
    b. 75%, 100% 200%
    c. 75%, 90%, 100%
    d. 50%, 100%, 200%

36. According to ASME B30.26, each new shackle body shall be marked to show which items listed below?
    a. Manufacturer's name and rated capacity.
    b. Type of shackle and Use.
    c. Included angle and throat opening.
    d. Pin size and thread type.

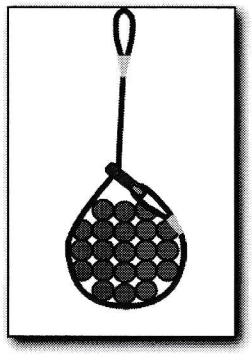
37. Referring to the rigger reference booklet, what is the capacity of a ¾ inch grade 100 alloy chain three leg sling lifting at a 45 degree angle?
    a. 60,000 pounds
    b. 72,500 pounds
    c. 74,900 pounds
    d. 91,700 pounds

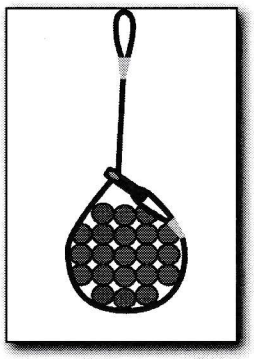
38. According to ASME B30.26, which of the following is NOT a requirement for each new shackle pin to be marked showing?
    a. Manufacturer name
    b. Load rating or grade
    c. Material type
    d. Size.

39. According to ASME B30.26, multiple sling legs should be attached to the shackle:
    a. pin
    b. bow

40. According to ASME B30.26, the screw pin of the shackle shall be:
    a. hand tight.
    b. backed off a half turn.
    c. fully engaged.
    d. backed off a full turn.

41. Which of the following illustrations is showing the correct orientation for the shackle when using the choke with the shackle hitch?

a. 

b. 

42. According to ASME B30.26, non-shouldered eyebolts shall only be used when the angle of loading is:
    a. 0^0 - 5^0
    b. 6^0 - 30^0
    c. 31^0 - 45^0
    d. 46^0 - 90^0

43. Referring to the rigger reference booklet, what would be the rated capacity of a 1-1/8 inch wire rope EIPS/IWRC mechanical splice two-leg sling lifting at a 45 degree angle?
    a. 24,000 pounds
    b. 28,000 pounds
    c. 34,000 pounds
    d. 42,000 pounds

44. Referring to the rigger reference booklet, what is the coefficient of friction for moving a metal load on concrete?
    a. .30
    b. .40
    c. .50
    d. .60

45. According to ASME B30.26, swivel hoist rings shall be marked to show which of the following items listed below?
    a. alloy of steel
    b. grade of steel
    c. torque value
    d. proof test value

46. Referring to the rigger reference booklet, what is the minimum number of wire rope clips when using 5/8 wire rope?
    a. 3
    b. 2
    c. 4
    d. 5

47. Referring to the rigger reference booklet, if the included angle is 90 degrees, what is the block factor when determining fairlead loading?
    a. 1.41
    b. 1.15
    c. 2.00
    d. 1.53

48. According to ASME B30.9, what is the minimum design factor for alloy steel chain slings?
    a. 1
    b. 2
    c. 3
    d. 4

49. Referring to the rigger reference booklet, what is the capacity of 7/8 inch shackle SP anchor type?
    a. 9,500 pounds
    b. 10,320 pounds
    c. 13,000 pounds
    d. 17,000 pounds

50. According to ASME B30.26, what is the only type of eyebolt that can be used for angular lifting?
    a. Tapped
    b. Untapped
    c. Shouldered
    d. Non-shouldered

51. Referring to the rigger reference booklet, how many pounds does one cubic foot of steel weigh?
    a. 480
    b. 380
    c. 280
    d. 180

52. Referring to the rigger reference booklet, what is the capacity of a ¾ inch nine part braided wire rope sling using a basket hitch?
    a. two ton
    b. four ton
    c. six ton
    d. eight ton

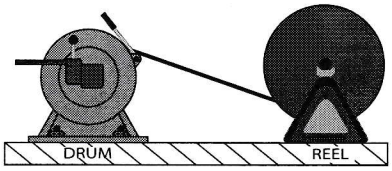
53. According to OSHA, metal mesh sling handles and metal fabric must have the same:
    a. net capacity
    b. rated capacity
    c. inspection criteria
    d. removal criteria

54. According to ASME B30.26, each new link, ring, and swivel shall be marked by the manufacturer to show which of the following listed below?
    a. size or rated load
    b. alloy or steel grade
    c. serial number
    d. all of the above

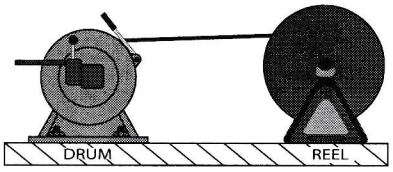
55. According to ASME B30.23, which of the following listed below shall not be used for suspension systems?
    a. wire rope bridle
    b. alloy steel chain bridle
    c. synthetic web bridle
    d. wire rope slings

56. When spooling wire rope from a reel to a drum, which of these illustrations is correct?

a.



b.



57. According to ASME B30.26, multiple slings in the body of a shackle shall not exceed what included angle?
    a. 180^0
    b. 160^0
    c. 140^0
    d. 120^0

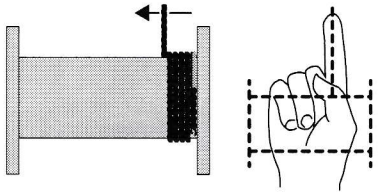
58. At each jobsite, prior to hoisting employees on the personnel platform, and after any repair or modification, the platform and rigging must be proof tested to ____ percent of the platform's rated capacity.
    a. 200%
    b. 125%
    c. 150%
    d. 100%

59. According to ASME, what is the maximum number of sling eyes that should be placed on a hook?
    a. 1
    b. 2
    c. 3
    d. 3

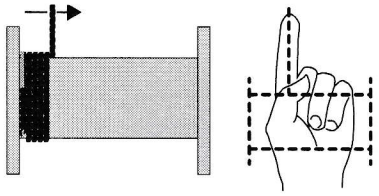
60. According to OSHA 1926.1431, rigging hardware must be capable of supporting at least ___ times the maximum intended load applied or transmitted to that component.
    a. 5
    b. 6
    c. 7
    d. 8

61. If you're spooling right lay wire rope onto a drum in an underwound manner, which side of the drum would the wedge be located?

a.



b.



62. When rigging loose pipe or tubing, which of the following hitches would provide the most contact between sling and load?
    a. Double baskets.
    b. single leg choker.
    c. Double wrap choke.
    d. Single basket.

63. What is the angle between the top of the load and the sling leg referred to in sling load charts?
    a. Vertical angle.
    b. Included angle.
    c. Working angle.
    d. Horizontal angle.

64. Which of the following information does NOT need to be on the label marking a lifting beam?
    a. Manufacturer's name.
    b. Weight of the beam.
    c. Length of the beam.
    d. Rated capacity.

65. When using synthetic web sling in a choker hitch and the manufacturer's tag does not include a rating for it, what percentage of the vertical hitch should be used to determine a rating?
    a. 25 percent
    b. 50 percent
    c. 80 percent
    d. 100 percent

66. According to ASME B30.26, the minimum design factor for all rigging hardware except rigging blocks, shackles over 150 ton and load indicating device are:
    a. 5
    b. 4
    c. 3
    d. 2

67. According to ASME B30.26, the design factor for shackles rated at over 150 tons, rigging blocks and load indicating devices shall be a minimum of:
    a. 2
    b. 3
    c. 4
    d. 5

68. When using jacking a load make sure that to place _____ between the jack and the load.
    a. a steel plate
    b. a piece of hardwood
    c. a piece of plywood
    d. nothing

69. According to ASME B30.26, which of the following is NOT a removal from service for shackles?
    a. Incomplete pin engagement.
    b. Missing or illegible manufacturer information.
    c. Excessive thread damage.
    d. Throat opening in excess of 5%.

70. According to ASME B30.9, when using synthetic web slings, a choke angle of less than ____ should not be used without appropriately reducing the rated load?
    a. 140^0
    b. 175^0
    c. 150^0
    d. 120^0

71. When removing a load binder that is under tension, what method would you use to release it?
    a. Use a pry bar to release it.
    b. Use a pipe over the handle.
    c. Stand over it a pull upward.
    d. Stand over it a pull downward

72. What knot is best for attaching two ropes of different sizes?
    a. Sheet Bend
    b. Granny Knot
    c. Clove Hitch
    d. Bowline

73. When using a turnbuckle which of the following is NOT a good safety practice?
    a. Fully engage end fitting and body threads.
    b. Verify components are in good working condition.
    c. No side loading.
    d. Angle loading is acceptable.

74. According to ASME B30.26, the horizontal angle of loading should not be less than 30 degrees unless approved by which person listed below?
    a. appointed
    b. assigned
    c. designated
    d. qualified

75. According to ASME B30.26, multiple slings or rigging hardware gathered in a link or ring shall not exceed what included angle?
    a. 90^0
    b. 100^0
    c. 110^0
    d. 120^0

76. When installing a wedge socket, it must be installed with the load line in a straight line from the:
    a. shank.
    b. point.
    c. pin.
    d. wedge.

77. When is it appropriate to use a pipe extension when securing or releasing a standard load binder?
    a. Always.
    b. Never.
    c. Only when securing.
    d. Only when releasing.

78. According to ASME B30.9, if the angle of choke is less than 30 degrees, the reduction in wire rope sling strength could be as much as:
    a. 29%
    b. 39%
    c. 49%
    d. 59%

79. When releasing a load binder by hand, what is the safest method?
    a. Push downward gripping with a tight fist.
    b. Push upward with an open hand.
    c. Pull upward gripping with a tight fist.
    d. Pull down with an open hand.

80. What is **NOT** a requirement when using a jack?
    a. Keep the jacks vertical.
    b. All jacks should be the same type and capacity.
    c. Do not leave a load on jacks unattended.
    d. You can use a cheater bar for extra lift.

For Use in CCO Written Examinations

REFERENCE BOOKLET
RIGGER

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This supplement is not to be used for any other purpose.

REV 04/14

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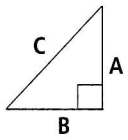
General Data

$A^2 + B^2 = C^2$
$C^2 - A^2 = B^2$
$C^2 - B^2 = A^2$



Area of a triangle = ½ × A × B

- d = diameter
- L = length
- W = width
- Circumference = π × d
- Volume of rectangular prism = L × W × H
- r = radius
- H = height
- π or Pi = 3.14
- Area of a circle = π × r^2
- Area of a square = L × W

Wire Rope Sling D/d Ratio Strength Efficiencies	
25:1	1.00
20:1	.92
15:1	.88
10:1	.86
4:1	.75
2:1	.65
1:1	.50

1 yard = 3 ft. = 36 in. = .91 meter
1 meter = 1.09 yd. = 3.28 ft. = 39.37 in.
1 ton (short) = .891 long ton = .91 metric ton = 2,000 lbs. = 907 kg
1 ton (metric) = 1.1 short ton = .98 long ton = 2,204 lb. = 1,000 kg
1 pound = .45 kg
1 kg = 1,000 grams = 2.2 lb.
1 gallon (U.S. liq.) = 4 qt. = 3.8 liters
1 liter = .264 gallon (U.S.) = 1.06 qt.
1 KIP = 1,000 lb.

Calculating Load Weights

Materials and Liquids - Pounds / cu. ft.			
Aluminum	168	Iron Casting	460
Asbestos	153	Lead	710
Asphalt	80	Lumber—Fir	40
Brass	521	Lumber—Oak	62
Brick	120	Lumber—Railroad Ties	50
Bronze	500	Oil, Motor	58
Coal	56	Paper	60
Concrete, Reinforced	150	Portland Cement	94
Crushed Rock	95	River Sand	120
Diesel	53	Rubber	94
Dry Earth, Loose	74	Steel	480
Gasoline	45	Water	62
Glass	160	Zinc	437

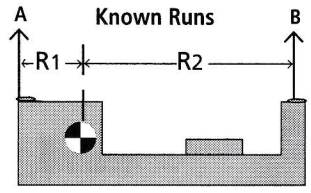
Pounds / sq. ft.	
Steel plate	
• 1/8 inch	5
• 1/4 inch	10
• 1/2 inch	20
• 1 inch	40
Aluminum plate	
• 1/8 inch	1.75
• 1/4 inch	3.50
Lumber	
• 3/4 inch Fir	2.5
• 3/4 inch Oak	4.0

Pounds / gallon	
Gasoline	6.0
Diesel	7.0
Water	8.3

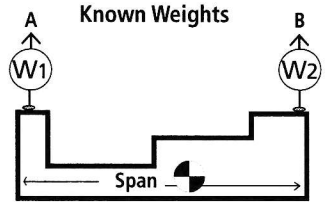
7.5 gallons of liquid to a cubic foot
27 cubic feet to a cubic yard

Load Factors & Weight Distribution

$$\text{Sling Tension} = \frac{\text{Sling Length (L)}}{\text{Sling Height (H)}} \times \text{share of load wt.}$$



Share of Load Wt. @ A	Share of Load Wt. @ B	Legend
$R_1 + R_2 = TS$ $\frac{R_2}{TS} = P$ P × W = Share of Load Wt. @ A	$R_1 + R_2 = TS$ $\frac{R_1}{TS} = P$ P × W = Share of Load Wt. @ B	R_1 = Run, Side 1 R_2 = Run, Side 2 TS = Total Span P = Percentage W = Weight of Load



CG In Feet From A	CG In Feet From B	Legend
$W_1 + W_2 = TW$ $\frac{W_2}{TW} = P$ P × S = CG in ft. from A	$W_1 + W_2 = TW$ $\frac{W_1}{TW} = P$ P × S = CG in ft. from B	W_1 = Weight at A W_2 = Weight at B TW = Total Weight P = Percentage S = Span

Level & Incline Planes

(4)

Legend	Formulas
W = Weight of load	Level: $F = CF \times W$
CF = Coefficient of Friction	Uphill: $F = (CF \times R/L \times W) + (W \times H/L)$
F = Force required to move load	Downhill: $F = (CF \times R/L \times W) - (W \times H/L)$
H = Height in feet	
R = Run, horizontal distance in feet	
L = Length of ramp in feet	

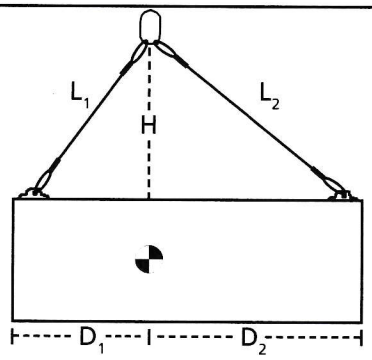
Coefficients of Friction [For Estimation Only]

Concrete on concrete	.65	Wood on metal	.30	Steel on steel	.10
Metal on concrete	.60	Cast iron on steel	.25	Load on wheels	.05
Wood on wood	.50	Continuous lubricated surface	.15	Load on ice	.01
Wood on concrete	.45			Load on air	.002

Level Pick Points

(5)

Legend
W = Load Weight
D_1 = Distance of Side 1
D_2 = Distance of Side 2
L_1 = Sling Length, Side 1
L_2 = Sling Length, Side 2
H = Vertical Height
TL_1 = Tension, Length 1
TL_2 = Tension, Length 2



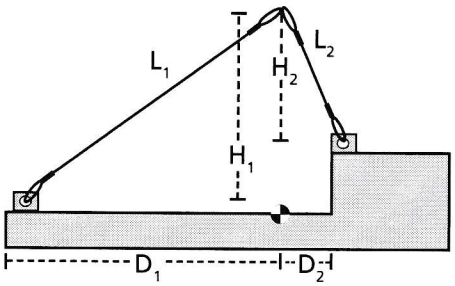
$$TL_1 = \frac{L_1 \times W \times D_2}{H \times (D_1 + D_2)}$$

$$TL_2 = \frac{L_2 \times W \times D_1}{H \times (D_1 + D_2)}$$

Off-level Pick Points

(6)

Legend
W = Load Weight
D_1 = Distance of Side 1
D_2 = Distance of Side 2
L_1 = Sling Length, Side 1
L_2 = Sling Length, Side 2
H_1 = Vertical Height, Side 1
H_2 = Vertical Height, Side 2
TL_1 = Tension, Length 1
TL_2 = Tension, Length 2



$$TL_1 = \frac{W \times D_2 \times L_1}{(D_2 \times H_1)+(D_1 \times H_2)}$$

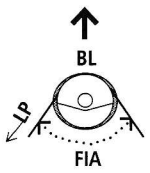
$$TL_2 = \frac{W \times D_1 \times L_2}{(D_2 \times H_1)+(D_1 \times H_2)}$$

Block & Fairlead Loading

(7)

Full Included Angle	Block Factor
180	0.00
170	0.17
160	0.35
150	0.52
140	0.68
130	0.84
120	1.00
110	1.15
100	1.29
90	1.41
80	1.53
70	1.64
60	1.73
50	1.81
40	1.87
30	1.93
20	1.97
10	1.99
0	2.00

Example



BL = Block Load
BF = Block Factor
LP = Line Pull
FIA = Full Included Angle

Formula
BL = BF × LP

Wire Rope EIPS/IWRC Sling Capacities (lb.)

Mechanical Splice

(8)

Size in inches			90°	60°	45°	30°
1/4	1,300	960	2,600	2,200	1,820	1,300
5/16	2,000	1,480	4,000	3,400	2,800	2,000
3/8	2,800	2,200	5,600	5,000	4,000	2,800
7/16	3,800	2,800	7,600	6,800	5,400	3,800
1/2	5,000	3,800	10,000	8,800	7,200	5,000
9/16	6,400	4,800	12,800	11,000	9,000	6,400
5/8	7,800	5,800	15,600	13,600	11,000	7,800
3/4	11,200	8,200	22,400	19,400	15,800	11,200
7/8	15,200	11,200	30,400	26,000	22,000	15,200
1	19,600	14,400	39,200	34,000	28,000	19,600
1-1/8	24,000	18,000	48,000	42,000	34,000	24,000
1-1/4	30,000	22,500	60,000	52,000	42,000	30,000

3-Part Braided Wire Rope Sling Capacities (tons)

9

Finished Diameter (inches)	Composed of 3 parts of EIP Rope (inches)				Weight Per Ft. Approx. (pounds)
1/2	1/4	1.7	1.3	3.4	.44
5/8	5/16	2.6	1.9	5.2	.68
3/4	3/8	3.6	2.7	7.2	.99
7/8	7/16	4.9	3.7	9.8	1.33
1	1/2	6.4	4.8	12.8	1.75
1-1/8	9/16	8.0	6.0	16.0	2.24
1-3/4	7/8	19.0	14.3	36.0	5.40
2-1/4	1-1/8	31.2	23.4	62.4	8.90
2-3/4	1-3/8	46.0	34.5	92.0	13.30
3-1/4	1-5/8	63.4	47.6	126.8	18.50
4	2	95.0	71.2	190.0	28.00
4-1/2	2-1/4	118.0	88.5	236.0	35.60
5	2-1/2	145.0	109.0	290.0	44.00

Basket-rated capacities based on D/d ratio of five times the wire rope's finished diameter.

9-Part Braided Wire Rope Sling Capacities (tons)

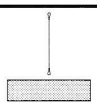
10

Finished Diameter (inches)	Composed of 9 parts of EIP Rope (inches)			
1/2	1/8	1.4	1.0	2.8
5/8	5/32	2.0	1.5	4.0
3/4	3/16	3.0	2.2	6.0
7/8	7/32	4.0	3.0	8.0
1	1/4	4.8	3.6	9.6
1-1/2	3/8	10.5	7.8	21.0
2	1/2	19.1	14.3	38.2
2-1/2	5/8	29.6	22.2	59.2
3	3/4	42.3	31.7	84.6
3-1/2	7/8	57.3	42.9	114.6
4	1	74.4	55.8	148.4
4-1/2	1-1/8	93.6	60.2	187.2

Basket-rated capacities based on D/d ratio of five times the wire rope's finished diameter.

Synthetic Sling Capacities (lbs.)

(11)

	Size or Code						
Web Eye / Eye	1-9-1	1,600	1,280	3,200	2,770	2,260	1,600
	1-9-2	3,200	2,560	6,400	5,540	4,452	3,200
	1-9-3	4,800	3,840	9,600	8,320	6,780	4,800
	1-9-4	6,400	5,120	12,800	11,090	9,040	6,400
	2-9-3	8,880	7,100	17,760	15,390	12,540	8,880
	2-9-4	11,520	9,210	23,040	19,960	16,270	11,520
Polyester Round	1	2,600	2,100	5,200	4,500	3,600	2,600
	2	5,300	4,200	10,600	9,100	7,500	5,300
	3	8,400	6,700	16,800	14,500	11,800	8,400
	4	10,600	8,500	21,200	18,300	14,900	10,600
	5	13,200	10,600	26,400	22,800	18,600	13,200
	6	16,800	13,400	33,600	29,100	23,700	16,800

High Capacity Round Sling Capacities (lbs.)*

(12)

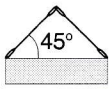
Dual-Path Model						Approx. Body Width (inches)
DP 1000	10,000	8,000	20,000	17,320	14,140	3
DP 1500	15,000	12,000	30,000	25,980	21,210	3
DP 2000	20,000	16,000	40,000	34,640	28,280	3
DP 2500	25,000	20,000	50,000	43,300	35,350	3
DP 3000	30,000	24,000	60,000	51,960	42,420	4
DP 4000	40,000	32,000	80,000	69,280	56,560	4
DP 5000	50,000	40,000	100,000	86,600	70,700	5
DP 6000	60,000	48,000	120,000	103,920	84,840	5
DP 7000	70,000	56,000	140,000	121,240	98,980	5
DP 8500	85,000	68,000	170,000	147,220	120,190	6
DP 10000	100,000	80,000	200,000	173,200	141,400	6
DP 12500	125,000	100,000	250,000	216,500	176,750	8
DP 15000	150,000	120,000	300,000	259,800	212,100	8
DP 17500	175,000	140,000	350,000	303,100	247,450	10
DP 20000	200,000	160,000	400,000	346,400	282,800	10
DP 25000	250,000	200,000	500,000	433,000	353,500	10
DP 27500	275,000	220,000	550,000	476,300	388,850	12
DP 30000	300,000	240,000	600,000	519,600	424,200	12
DP 40000	400,000	320,000	800,000	692,800	565,600	14
DP 50000	500,000	400,000	1,000,000	866,000	707,000	16

*Capacities shown include both paths and are for one complete sling; sling ratings based on fittings of equal or greater capacity.

Alloy Chain Sling Capacities (lbs.)

(13)

Grade 80

Size in inches	Single Leg		Two Leg Slings			Three & Four Leg Slings	
						60°	45°
9/32	3,500	2,800	6,100	4,900	3,500	9,150	7,400
3/8	7,100	5,700	12,300	10,000	7,100	18,400	15,100
1/2	12,000	9,600	20,800	17,000	12,000	31,200	25,500
5/8	18,100	14,500	31,300	25,600	18,100	47,000	38,400
3/4	28,300	22,600	49,000	40,000	28,300	73,500	60,000
7/8	34,200	27,400	59,200	48,400	34,200	88,900	72,500
1	47,700	38,200	82,600	67,400	47,700	123,900	101,200
1-1/4	72,300	57,800	125,200	102,200	72,300	187,800	153,400

Grade 100

9/32	4,300	3,500	7,400	6,100	4,300	11,200	9,100
3/8	8,800	7,100	15,200	12,400	8,800	22,900	18,700
1/2	15,000	12,000	26,000	21,200	15,000	39,000	31,800
5/8	22,600	18,100	39,100	32,000	22,600	58,700	47,900
3/4	35,300	28,300	61,100	49,900	35,300	91,700	74,900
7/8	42,700	34,200	74,000	60,400	42,700	110,900	90,600

Rigging Hardware Capacities (lbs.)

(14)

Size in inches	Shoulder Eye Bolt		Turnbuckle	Shackle	Wire Rope Clip			Swivel Hoist Rings	Alloy Master Links
	In Line	45 deg.	Eye or Jaw	SP Anchor	Min. # clips	Turnback (inches)	Torque (ft. lbs.)	WLL (lbs.)	WLL (lbs.)
1/4	500	125	500	1,000	2	4.75	15	-------	-------
5/16	800	200	800	1,500	2	5.25	30	800	-------
3/8	1,200	300	1,200	2,000	2	6.50	45	1,000	-------
7/16	-----	------	--------	3,000	2	7.00	65	-------	-------
1/2	2,200	550	2,200	4,000	3	11.50	65	2,500	7,400
9/16	-----	------	--------	------	3	12.00	95	-------	-------
5/8	3,500	875	3,500	6,500	3	12.00	95	4,000	9,000
3/4	5,200	1,300	5,200	9,500	4	18.00	130	5,000	12,300
7/8	7,200	1,800	7,200	13,000	4	19.00	225	8,000	15,200
1	10,000	2,500	10,000	17,000	5	26.00	225	10,000	26,000
1-1/8	-----	------	--------	19,000	6	34.00	225	-------	-------
1-1/4	15,200	3,800	15,200	24,000	7	44.00	360	15,000	39,100
1-1/2	-----	------	--------	------	----	------	------	-------	61,100
2	-----	------	--------	------	----	------	------	-------	102,600
2-1/2	-----	------	--------	------	----	------	------	-------	160,000
3	-----	------	--------	------	----	------	------	-------	228,000
3-1/2	-----	------	--------	------	----	------	------	-------	279,000
4	-----	------	--------	------	----	------	------	-------	373,000

Synthetic Sling Shackle

(15)

Round Sling Size (No.)	Web Slings*		Working Load Limit (Tons)
	Webbing Width (in.)	Eye Width (in.)	
1	2	2	3-1/4
2	2	2	3-1/4
3	3	1.5	4-1/2
4	4	2	6-1/4
5	6	3	8-1/2
6	6	3	8-1/2

* NOTE: Designed for use with Type III, (Eye & Eye), Class 7, 2 Ply web slings. For 3" and larger webbing width, tapered eye is required.

Wide Body Shackles

(16)

Working Load Limit (Tons)	Weight Each (lbs.)	Dimensions in Inches		
		B +/- .02	D +/- .02	Effective Body Diameter
7	4.0	1.25	0.88	2.1
12.5	8.8	1.69	1.13	2.4
18	14.9	2.03	1.38	2.8
30	26.5	2.37	1.63	4.1
40	35.0	2.88	2.00	3.6
55	68.0	3.25	2.25	4.3
75	99.0	4.13	2.75	5.9
125	161	5.12	3.15	6.8
200	370	5.91	4.12	8.9
300	847	7.38	5.25	11.8
400	1130	8.66	6.30	14.3

"B" is spread between shackle ears
"D" is shackle pin diameter

Effective Body Diameter is the diameter to use when calculating D/d ratio for sling:

D = effective body diameter
d = sling diameter