## APPENDIX

Figures and Tables of Useful

## Information


Note: Permissible rope dlameters are for new rope used under favorable conditions. As rope ages or deteriorates, increase the factor of safety progressively to 8 when selecting rope size. Lead line pull is not affected by age or condition.

Figure A-1. Simple block-and-tackle rigging for manila rope (FS 3)

Table A-1. Simple block and tackle rigging for plow steel wire rope (FS 6)

| Load to be Lifted (tons) | Smallest Permissible Rope Diameter (Inches)/ Lead Line Pull (pounds) | Total Number of Sheaves in Blocks |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | 2 (2 Single Blocks) | $\begin{aligned} & 3 \text { (1-Single } \\ & \text { 1-Double) } \end{aligned}$ | $\begin{gathered} 4 \text { (2-Double } \\ \text { Blocks) } \end{gathered}$ | $\begin{aligned} & 5 \text { (1-Double } \\ & \text { 1-Triple) } \end{aligned}$ | 6 (2-Triple Blocks) |
| 1 | Rope | 3/8 | 3/8 | 3/8 | 3/8 | 3/8 |
|  | Pull | 1,000 | 720 | 560 | 460 | 400 |
| 2 | Rope | 1/2 | 3/8 | 3/8 | 3/8 | 3/8 |
|  | Pull | 2,100 | 1,400 | 1,100 | 920 | 800 |
| 4 | Rope | 5/8 | 1/2 | 1/2 | 3/8 | 3/8 |
|  | Pull | 4,200 | 2,900 | 2,200 | 1,800 | 1,600 |
| 6 | Rope | 3/4 | 5/8 | 5/8 | 1/2 | 1/2 |
|  | Pull | 6,200 | 4,300 | 3,400 | 2,800 | 2,400 |
| 8 | Rope | 7/8 | 3/4 | 5/8 | 5/8 | 5/8 |
|  | Pull | 8,300 | 5,800 | 4,500 | 3,700 | 3,200 |
| 10 | Rope | 1 | 7/8 | 3/4 | 5/8 | 5/8 |
|  | Pull | 10,400 | 7,200 | 5,600 | 4,600 | 4,000 |
| 15 | Rope | 1 1/8 | 1 | 7/8 | 3/4 | 3/4 |
|  | Pull | 15,600 | 10,800 | 8,400 | 6,900 | 6,000 |
| 20 | Rope | $11 / 2$ | $11 / 8$ | 1 | 7/8 | 7/8 |
|  | Pull | 20,800 | 14,400 | 11,200 | 9,200 | 8,000 |

Table A-2. Recommended sizes of tackle blocks

| Wire Rope |  | Manila Rope |  |
| :---: | :---: | :---: | :---: |
| Rope Diameter <br> (inches) | Outside Diameter of <br> Sheave (inchee) | Rope Dlameter <br> (inches) | Length of Shell <br> (inches) |
| $3 / 8$ | $6-8$ | $1 / 2$ | 4 |
| $1 / 2$ | $8-10$ | $5 / 8$ | 6 |
| $5 / 8$ | $10-12$ | $3 / 4$ | $6-7$ |
| $3 / 4$ | $12-16$ | $7 / 8$ | $7-8$ |
| $7 / 8$ | $14-18$ | 1 | $8-10$ |
| 1 | $14-20$ | $11 / 8$ | $8-10$ |
|  |  | $11 / 4$ | $10-12$ |
|  |  | $11 / 2$ | $12-14$ |
|  |  | $13 / 4$ | $14-16$ |
| Note: <br> Largest diameter of sheave for a given size of rope is proferred, when avaliable, except <br> that for $6 \times 37$ wire rope, the smaller diamoter of sheave is suitable. |  |  |  |

Table A-3. Bearing capacity of soils

| General Description | Condition | Safe Allowable Pressure (PSI) |
| :---: | :---: | :---: |
| Fine-grained soils: clays, silts, very fine sands, or mixtures of these containing few coarse particles of sand or gravel. Classification: $\mathrm{MH}, \mathrm{CH}, \mathrm{OH}, \mathrm{ML}$, CL , and OL . | Soft, unconsolidated, having high moisture content (mud) | 1,000 |
|  | Stiff, partly consolidated, medium moisture content | 4,000 |
|  | Hard, well consolidated, low moisture content (slightly damp to dry) | 8,000 |
| Sands and well-graded sandy soils, containing some silt and clay. Classification: SW, SC, SP, and SF. | Loose, not confined | 3,000 |
|  | Loose, confined | 5,000 |
|  | Compact | 10,000 |
|  | Loose, not confined | 4,000 |
| Gravel and well-graded gravelly soils containing some sand, silt and clay. Classification: GW, GC, and GP. | Loose, confined | 6,000 |
|  | Compact | 12,000 |
|  | Cemented sand and gravel | 16,000 |
| Rock | Poor quality rock, soft and fractured; also hardpan | 10,000 |
|  | Good quality; hard and solid | 20,000 |



Figure A-2. Safe loads on screw-pin shackles

|  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A | Stress (pounds) in Guy for W = 1,000 Pounds |  |  |  |  |
|  | $B=1 / 2 L$ | $B=1 / 2 L$ | $B=L$ | $B=11 / 2 L$ | $B=2 \mathrm{~L}$ |
| 0 | 0 | 0 | 0 | 0 | 0 |
| 1/10L | 230 | 180 | 150 | 130 | 120 |
| 1/8L | 300 | 220 | 190 | 160 | 150 |
| 1/6L | 400 | 300 | 260 | 220 | 200 |
| 1/4L | 630 | 480 | 410 | 350 | 320 |
| 1/3L | 890 | 680 | 580 | 480 | 440 |
| Stress (pounds) in Spar for W=1,000 Pounds |  |  |  |  |  |
| 0 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| 1/10L | 1,210 | 1,140 | 1,100 | 1,070 | 1,050 |
| 1/8L | 1,260 | 1,180 | 1,140 | 1,090 | 1,070 |
| 1/6L | 1,350 | 1,240 | 1,180 | 1,130 | 1,100 |
| 1/4L | 1,550 | 1,380 | 1,290 | 1,210 | 1,160 |
| 1/3L | 1,770 | 1,530 | 1,420 | 1,300 | 1,240 |
| W = Weight to be lifted plus $1 / 2$ the weight of the pole <br> $\mathrm{A}=$ Drift <br> B = Horizontal distance from the base of the pole to the guy <br> L = Length of the gin pole |  |  |  |  |  |

Figure A-3. Stresses in guys and spars of gin poles

Figures and Tables of Useful Information A-5

|  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A | Stress (pounds) in Guy for $\mathrm{F}=1,000$ Pounds |  |  |  |  |
|  | $B=1 / 2 \mathrm{~L}$ | $\mathrm{B}=3 / 4 \mathrm{~L}$ | $B=L$ | $B=11 / 2 L$ | $B=2 L$ |
| 0 | 2,240 | 1,670 | 1,420 | 1,200 | 1,120 |
| 0.50 | 2,000 | 1,490 | 1,260 | 1,080 | 1,000 |
| 0.667 | 1,860 | 1,390 | 1,180 | 1,000 | 930 |
| 1.00 | 1,570 | 1,180 | 1,000 | 850 | 790 |
| 1.33 | 1,340 | 1,000 | 850 | 720 | 670 |
| 2.00 | 1,000 | 750 | 630 | 540 | 500 |
| Stress (pounds) in Mast for $F=\mathbf{1 , 0 0 0}$ Pounds |  |  |  |  |  |
| 0 | 2,000 | 1,330 | 1,000 | 670 | 500 |
| 0.50 | 2,240 | 1,640 | 1,340 | 1,040 | 900 |
| 0.667 | 2,220 | 1,660 | 1,390 | 1,110 | 970 |
| 1.00 | 2,120 | 1,650 | 1,410 | 1,180 | 1,060 |
| 1.33 | 2,000 | 1,600 | 1,400 | 1,200 | 1,100 |
| 2.00 | 1,800 | 1,490 | 1,340 | 1,190 | 1,120 |
| F = Total force on boom lift falls <br> $A=$ Vertical distance for each unit of horizontal distance <br> $B=$ Horizontal distance from the base of the mast to the guy <br> $\mathrm{L}=$ Length of the mast |  |  |  |  |  |

Figure A-4. Stresses in guys and mast of guy derrick

