



LEVEL 1 MOBILE CRANE THEORY EXAM PRACTICE QUESTION FIGURE BOOKLET




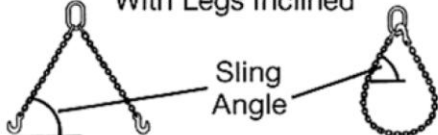
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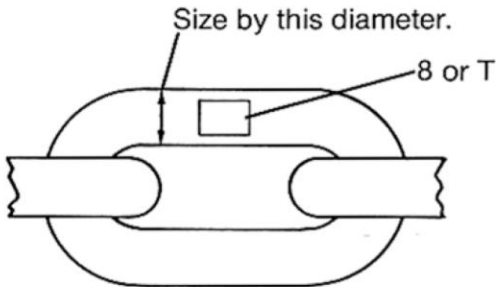
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FIGURE 1 – PAGE 1 OF 5

Chain Slings

GRADE T (8) ALLOY STEEL						
Chain Size (Inches)	Working Load Limit in pounds					
	Single Vertical Hitch	Single Choker Hitch	Single Basket Hitch (Vertical Legs)	2-Leg Bridle Hitch & Single Basket Hitch With Legs Inclined		
						
				60°	45°	30°
1/4	2,800	2,100	5,600	4,850	3,959	2,800
3/8	5,680	4,260	11,360	9,838	8,032	5,680
1/2	9,600	7,200	19,200	16,627	13,574	9,600
5/8	14,480	10,860	28,960	25,079	20,475	14,480
3/4	22,640	16,980	45,280	39,212	32,013	22,640
7/8	27,360	20,520	54,720	47,388	38,687	27,360
1	38,160	28,620	76,320	66,093	53,958	38,160
1 1/4	57,840	43,380	115,680	100,179	81,786	57,840



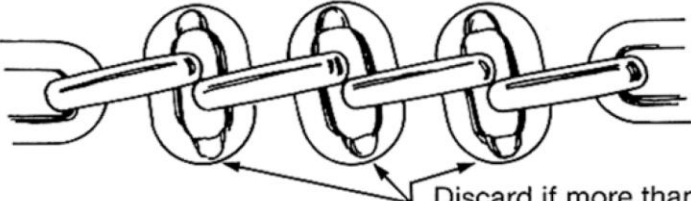
Size by this diameter.

8 or T

Use only alloy steel chain. Links will be stamped with 8 or T.

When using a 2-leg bridle in a choker hitch configuration, multiply the above values by .75.

When using a double basket hitch configuration, multiply the above values by 2.



Discard if more than 10% wear at bearing surfaces.

Note: For training and assessment use only.

FIGURE 1 – PAGE 2 OF 5

Nylon Web Slings



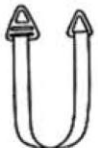

6800 lb/in Material						
Web Width (Inches)	Working Load Limit in pounds					
	Single Vertical Hitch	Single Choker Hitch	Single Basket Hitch (Vertical Legs)	2-Leg Bridle Hitch & Single Basket Hitch With Legs Inclined		
						
				60°	45°	30°
1	1,100	825	2,200	1,905	1,555	1,100
2	2,200	1,650	4,400	3,810	3,110	2,200
3	3,300	2,475	6,600	5,715	4,665	3,300
4	4,400	3,300	8,800	7,620	6,220	4,400
5	5,500	4,125	11,000	9,525	7,775	5,500
6	6,600	4,950	13,200	11,430	9,330	6,600
				When using a 2-leg bridle in a choker hitch configuration, multiply the above values by .75 .		
				When using a double basket hitch configuration, multiply the above values by 2 .		
Note: Capacities are for flat eye, twisted eye and triangle fittings. For training and assessment use only.						

FIGURE 1 – PAGE 3 OF 5

Wire Rope Slings




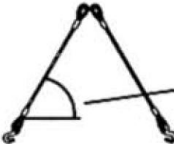

6 x 19 Classification Group, Improved Plow Steel, IWRC						
Rope Diameter (Inches)	Working Load Limit in pounds					
	Single Vertical Hitch	Single Choker Hitch	Single Basket Hitch (Vertical Legs)	2-Leg Bridle Hitch & Single Basket Hitch With Legs Inclined		
						
				60°	45°	30°
3/16	650	480	1,300	1,100	900	650
1/4	1,150	860	2,300	2,000	1,600	1,150
5/16	1,750	1,300	3,500	3,000	2,500	1,750
3/8	2,550	1,900	5,100	4,400	3,600	2,550
7/16	3,450	2,600	6,900	6,000	4,900	3,450
1/2	4,700	3,500	9,400	8,150	6,650	4,700
9/16	5,700	4,200	11,400	9,900	8,050	5,700
5/8	7,100	5,300	14,200	12,300	10,000	7,100
3/4	10,200	7,650	20,400	17,700	14,400	10,200
7/8	13,750	10,300	27,500	23,800	19,400	13,750
1	17,950	13,450	35,900	31,100	25,400	17,950
1 1/8	22,750	17,000	45,500	39,400	32,200	22,750
1 1/4	28,200	21,200	56,400	48,800	39,900	28,200
1 3/8	34,800	26,100	69,600	60,300	49,200	34,800
1 1/2	41,300	31,000	82,600	71,500	58,400	41,300
				When using a 2-leg bridle in a choker hitch configuration, multiply the above values by .75 .		
				When using a double basket hitch configuration, multiply the above values by 2 .		
Note: For training and assessment use only.						

FIGURE 1 – PAGE 4 OF 5

Eye Bolts

Stock Diameter (Inches)	Working Load Limit in pounds			
	Vertical	60°	45°	Less than 45°
1/4	500	175	125	NOT RECOMMENDED
5/16	800	280	200	
3/8	1,200	420	300	
1/2	2,200	770	550	
5/8	3,500	1,225	875	
3/4	5,200	1,820	1,300	
7/8	7,200	2,520	1,800	
1	10,000	3,500	2,500	
1 1/4	15,200	5,320	3,800	
1 1/2	21,400	7,490	5,350	

SHOULDER BOLTS

Correct for Shoulder Eye and Ring Bolts
Providing loads are reduced to account for angular loading

Nut must be properly torqued.

Ensure that bolt is tightened into place.

Ensure that tapped hole is deep enough.

Pack with washers to ensure that shoulder is firmly in contact with surface.

Incorrect

Shoulder must be in full contact with surface.

SHOULDERLESS BOLTS

Correct
Shoulderless eye and ring bolts are designed for vertical loads only.

Shoulderless Eye Bolt

Shoulderless Ring Bolt

Incorrect
If shoulderless eye and ring bolts are pulled at an angle as shown they will either bend or break

Results In

Shoulderless Eye Bolt

Shoulderless Ring Bolt

Note: For training and assessment use only.

FIGURE 1 – PAGE 5 OF 5

Shackle Capacities

Stock Diameter (Inches)	Inside Width At Pin (Inches)	Working Load Limit (Pounds)
$\frac{3}{16}$	$\frac{3}{8}$	665
$\frac{1}{4}$	$\frac{15}{32}$	1,000
$\frac{5}{16}$	$\frac{17}{32}$	1,500
$\frac{3}{8}$	$\frac{21}{32}$	2,000
$\frac{7}{16}$	$\frac{23}{32}$	3,000
$\frac{1}{2}$	$\frac{13}{16}$	4,000
$\frac{5}{8}$	$1 \frac{1}{16}$	6,500
$\frac{3}{4}$	$1 \frac{1}{4}$	9,500
$\frac{7}{8}$	$1 \frac{7}{16}$	13,000
1	$1 \frac{11}{16}$	17,000
$1 \frac{1}{8}$	$1 \frac{13}{16}$	19,000
$1 \frac{1}{4}$	$2 \frac{1}{32}$	24,000
$1 \frac{3}{8}$	$2 \frac{1}{4}$	27,000
$1 \frac{1}{2}$	$2 \frac{3}{8}$	34,000
$1 \frac{3}{4}$	$2 \frac{7}{8}$	50,000
2	$3 \frac{1}{4}$	70,000
$2 \frac{1}{2}$	$4 \frac{1}{8}$	100,000
3	5	150,000

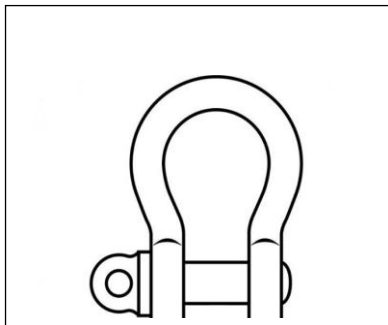


FIGURE 2

Folding Boom Load Chart

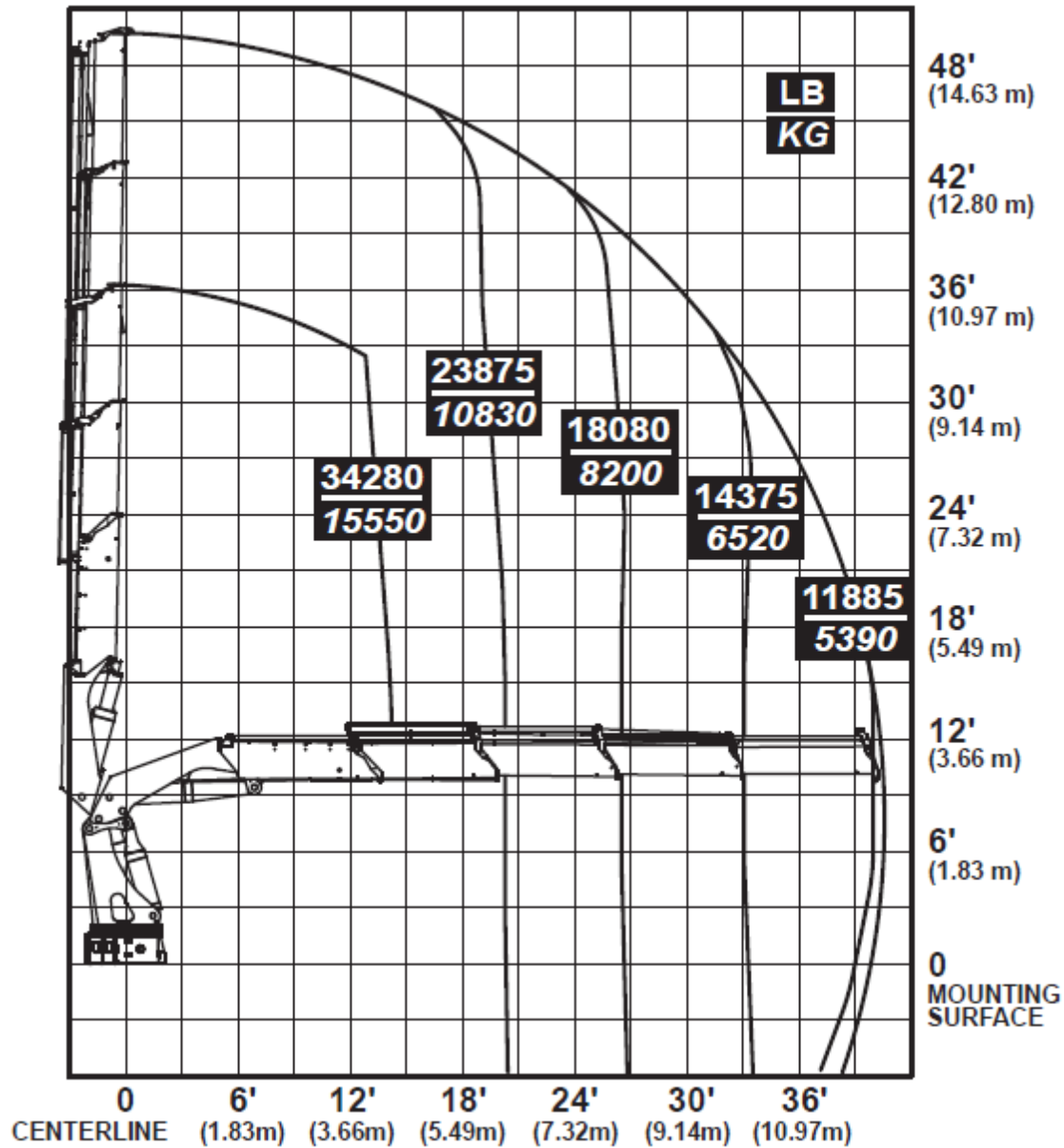


FIGURE 3 – PAGE 1 OF 2

Stiff Boom Load Charts

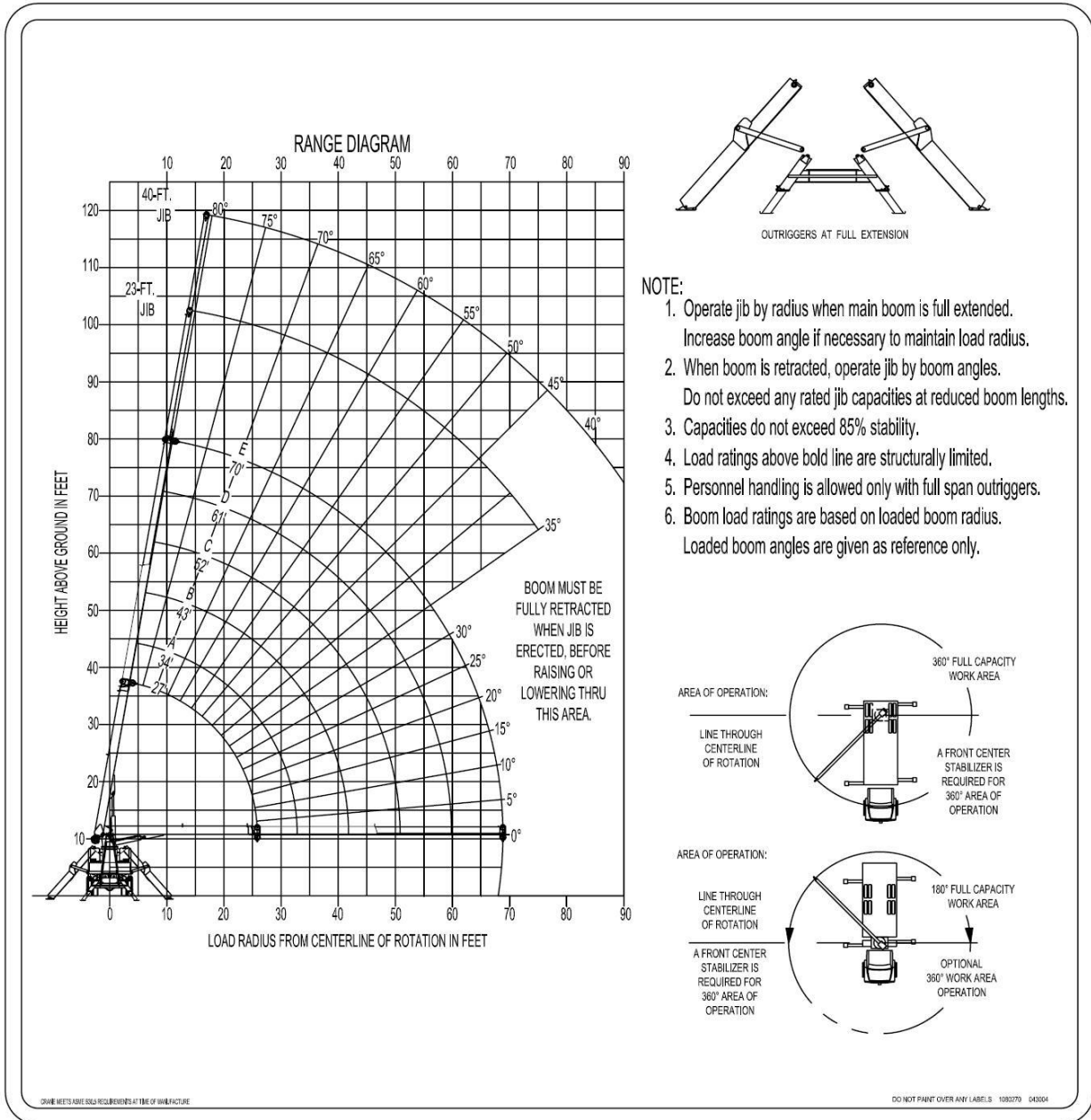


FIGURE 3 – PAGE 2 OF 2

Stiff Boom Load Charts

MAIN BOOM LOAD RATINGS WITH FULLY EXTENDED OUTRIGGERS												
MAIN BOOM LOAD RATINGS												
LOAD RATINGS IN LBS. WITH OUTRIGGERS AND STABILIZERS EXTENDED												
LOAD RADIUS IN FEET	LOADED BOOM ANGLE	27-FT	LOADED BOOM ANGLE	A 34-FT	LOADED BOOM ANGLE	B 43-FT	LOADED BOOM ANGLE	C 52-FT	LOADED BOOM ANGLE	D 61-FT	LOADED BOOM ANGLE	E 70-FT
5	79	36000										
10	68	21300	73	19500	77	16500	80	15000				
15	56	15200	64	14500	70	13500	75	12000	78	10500	80	9600
20	41	11500	54	11100	63	10000	69	9000	73	8000	76	7300
25	19	8600	43	8500	55	8000	62	7200	68	6500	71	5800
30			27	6750	47	6400	56	5900	63	5400	67	4900
35					36	5000	49	4700	56	4400	62	4200
40					20	4200	41	4100	50	3900	56	3700
45							30	3500	43	3400	51	3200
50							14	2800	36	2800	45	2700
55									26	2400	39	2300
60											32	1900
65											22	1550
	0	6000	0	4200	0	3000	0	1900	0	1300	0	1000
	340		270		210		170		150		130	
	530		420		330		270		230		200	

JIB LOAD RATINGS					
LOAD RATINGS IN LBS. WITH OUTRIGGERS AND STABILIZERS EXTENDED					
23-FT FIXED LENGTH JIB			23-40 FT EXTENDABLE JIB		
LOADED BOOM ANGLE	23-FT JIB	LOADED BOOM ANGLE	23-FT JIB RETRACTED	LOADED BOOM ANGLE	40-FT JIB EXTENDED
80	4600	80	4500	80	2600
75	3700	75	3600	75	2000
70	3000	70	2900	70	1900
65	2400	65	2300	65	1800
60	2000	60	1900	60	1300
55	1600	55	1500	55	900
50	1400	50	1300	50	800
45	1100	45	1000	45	600
40	900	40	800		
35	700	35	600		

NOTICE


- DO NOT DEADHEAD LINE BLOCK AGAINST BOOM TIP WHEN EXTENDING BOOM

- KEEP AT LEAST 5 WRAPS OF LOADLINE ON THE WINCH DRUM AT ALL TIMES

- USE ONLY 9/16" DIAMETER WIRE ROPE, AS SPECIFIED BELOW, WITH THE PROPER BREAKING STRENGTHS LISTED


- ANTI-TWO-BLOCK SYSTEM MUST BE IN GOOD OPERATING CONDITION BEFORE OPERATING CRANE. SEE OPERATION & SAFETY MANUAL

1-PART LINE




MAX PULL: 9,600 lbs

2-PART LINE




19,200 lbs

3-PART LINE



28,800 lbs

4-PART LINE



36,000 lbs

9/16" - 6 x 37 IWRC (3.5:1 S.F.) 33,600-lbs. BREAKING STRENGTH

9/16" - SPIN RESISTANT (5:1 S.F.) 45,300-lbs. BREAKING STRENGTH

9/16" - SPIN RESISTANT (5:1 S.F.) 38,400-lbs. BREAKING STRENGTH

ELLIOTT EQUIPMENT CO. SUPPLIED LOADLINE EQUIPMENT DEDUCTIONS:

DOWNHAUL WEIGHT180 lbs

ONE SHEAVE BLOCK.....375 lbs

TWO SHEAVE BLOCK.....640 lbs

CRANE MEETS ASME B30.1 REQUIREMENTS AT TIME OF MANUFACTURE

DO NOT PAINT OVER ANY LABELS 1000270 3/2004

FIGURE 4 – PAGE 1 OF 4

Hydraulic 80 Tonnes and Under Load Charts

Rated Lifting Capacities on Outriggers Fully Extended

Radius in Feet	Main Boom Length in Feet							
	29	40	50	60	70	80	90	95
10	60,000 (60.5)	48,000 (69.5)	45,000 (74.5)					
12	54,650 (56)	48,000 (66.5)	44,950 (72)	*37,000 (76)				
15	42,850 (47.5)	43,800 (61.5)	40,000 (68)	36,000 (72)	*27,400 (76)	*21,000 (76)		
20	30,700 (30)	31,650 (53)	32,100 (61.5)	29,500 (67)	27,400 (71)	21,000 (73.5)	*17,000 (76)	*15,500 (76)
25		24,050 (42.5)	24,500 (54.5)	24,000 (61.5)	23,100 (66.5)	19,000 (70)	16,500 (72.5)	15,300 (74)
30		18,800 (29)	19,250 (47)	19,550 (56)	19,600 (61.5)	15,900 (66)	14,100 (69)	13,100 (70.5)
35			15,550 (38)	15,850 (49.5)	16,000 (56.5)	13,800 (61.5)	12,700 (65.5)	11,400 (67.5)
40			12,800 (26)	12,950 (42.5)	12,700 (51.5)	12,000 (57.5)	10,700 (62)	10,000 (64)
45				10,450 (34.5)	10,300 (46)	10,400 (53)	9,300 (58.5)	8,800 (60.5)
50				8,610 (23.5)	8,500 (39.5)	8,600 (48)	8,100 (54.5)	7,900 (57)
55					7,170 (32)	7,200 (43)	7,100 (50)	7,100 (53)
60					6,000 (22)	6,030 (37)	6,100 (45.5)	6,100 (49)
65						5,080 (30)	5,100 (40.5)	5,100 (44.5)
70						4,270 (20.5)	4,300 (35)	4,300 (40)
75							3,650 (28.5)	3,700 (34.5)
80							3,100 (20)	3,100 (28)
85								2,600 (20)
Minimum boom angle (°) for indicated length (no load)								0
Maximum boom length (ft.) at 0° boom angle (no load)								95

NOTE: () Boom angles are in degrees.

FIGURE 4 – PAGE 2 OF 4

26 Foot – 45 Foot Tele Off-Settable Boom Extension

Radius in Feet	**26 ft. LENGTH		45 ft. LENGTH	
	0° OFFSET	30° OFFSET	0° OFFSET	30° OFFSET
30	*8,200 (76)			
35	8,200 (73.5)		*5,250 (76)	
40	8,200 (71)	*5,780 (76)	5,250 (75)	
45	8,120 (68.5)	5,780 (73.5)	4,940 (73)	
50	7,350 (66)	5,360 (71)	4,540 (71)	
55	6,370 (63)	4,750 (68)	4,150 (68.5)	*2,730 (76)
60	5,670 (60.5)	4,290 (65)	3,890 (66)	2,730 (74.5)
65	4,820 (57.5)	3,870 (62)	3,740 (64)	2,730 (72)
70	4,200 (54.5)	3,530 (59)	3,600 (61.5)	2,580 (69.5)
75	3,680 (51.5)	3,230 (56)	3,470 (59)	2,520 (67)
80	3,080 (48.5)	3,000 (52.5)	3,240 (56.5)	2,460 (64)
85	2,520 (45)	2,780 (49)	3,050 (54)	2,420 (61.5)
90	2,050 (41)	2,410 (45)	2,820 (51)	2,390 (58.5)
95	1,670 (37)	1,970 (40.5)	2,480 (48.5)	2,370 (55.5)
100	1,370 (32.5)	1,580 (35.5)	2,090 (45.5)	2,310 (52)
105	1,020 (27.5)		1,740 (42)	2,000 (49)
110			1,430 (38.5)	1,580 (45)
115			1,150 (35)	1,260 (40.5)
120			900 (30.5)	
for indicated length (no load)	24°	30°	30°	30°
Max. boom length at 0° boom angle (no load)	80 ft.		80 ft.	

NOTE: () Boom angles are in degrees.

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BOOM EXTENSION CAPACITY NOTES:

1. All capacities above the bold line are based on structural strength of boom extension.
 2. 26ft. and 45ft. boom extension lengths may be used for single line lifting service.
 3. Radii listed are for a fully extended boom with the boom extension erected. For main boom lengths less than fully extended, the rated loads are determined by boom angle. Use only the column which corresponds to the boom extension length and offset for which the machine is configured. For boom angle not shown, use the rating of the next lower boom angle.
- WARNING:** Operation of this machine with heavier loads than the capacities listed is strictly prohibited. Machine tipping with boom extension occurs rapidly and without advance warning.
4. Boom angle is the angle above or below horizontal of the longitudinal axis of the boom base section after lifting rated load.
 5. Capacities listed are with outriggers fully extended and verticle jacks set only.

FIGURE 4 – PAGE 3 OF 4

On Rubber Capacities

Stationary Capacities – 360 Degrees

Radius in Feet	Main Boom Length in Feet			
	29	40	50	60
10	25,550 (60.5)	25,550 (70)	*16,450 (76)	
12	20,600 (56)	20,600 (66.5)	16,450 (72)	
15	14,350 (47.5)	14,350 (62)	14,350 (68)	14,350 (72.5)
20	8,280 (30)	8,280 (53)	8,280 (61.5)	8,280 (67)
25		5,330 (42.5)	5,330 (54.5)	5,330 (61.5)
30		3,630 (29)	3,630 (47)	3,630 (56)
35			2,500 (38)	2,500 (49.5)
40			1,690 (26)	1,690 (42.5)
45				1,090 (34.5)
Min. boom angle for indicated length (no load)				34°
Max. boom length at 0° boom angle (no load)				50 ft.

NOTE: () Boom angles are in degrees.

*This chart is based upon maximum boom angle.

Lifting Capacity at Zero Degree On Rubber - 360°				
Boom Angle	Main Boom Length in Feet			
	29	40	50	
0°	6,110 (22.8)	2,730 (33.8)	1,210 (43.8)	

NOTE: Reference radii in feet.

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Stationary Capacities – Defined Arc Over Front

Radius in Feet	Main Boom Length in Feet			
	29	40	50	60
10	30,100 (60.5)	26,550 (70)	16,450 (74.5)	
12	26,550 (56)	22,100 (66.5)	16,450 (72)	
15	22,100 (47.5)	22,100 (62)	16,450 (68)	16,450 (72.5)
20	16,050 (30)	16,050 (53)	16,050 (61.5)	16,050 (67)
25		11,005 (42.5)	11,005 (54.5)	11,005 (61.5)
30		8,060 (29)	8,060 (47)	8,060 (56)
35			6,110 (38)	6,110 (49.5)
40			4,720 (26)	4,720 (42.5)
45				3,680 (34.5)
50				2,870 (23.5)
Min. boom angle for indicated length (no load)				0°
Max. boom length at 0° boom angle (no load)				60 ft.

NOTE: () Boom angles are in degrees.

Lifting Capacity at Zero Degree On Rubber Stationary- Defined Arc Boom Centered Over Front				
Boom Angle	Main Boom Length in Feet			
	29	40	50	60
0°	12,700 (22.8)	6,500 (33.8)	3,890 (43.8)	2,360 (53.8)

NOTE: Reference radii in feet.

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FIGURE 4 – PAGE 4 OF 4

Weight Reductions for Load Handling Devices

26 ft. Offsettable Boom Extension	
*Erected -	2,960 lbs.
26 ft. - 45 ft. Tele. Boom Extension	
*Erected (Retracted) -	4,220 lbs.
*Erected (Extended) -	5,780 lbs.

*Reduction of main boom capacities

Auxiliary Boom Nose	142 lbs.
Hookblocks and Headache Balls:	
30 Ton, 3 Sheave	580 lbs.+
15 Ton, 2 Sheave	425 lbs.+
7.5 Ton Overhaul Ball	354 lbs.+
7.5 Ton Headache Ball	338 lbs.+

+Refer to rating plate for actual weight.

When lifting over swingaway and/or jib combinations, deduct total weight of all load handling devices reeved over main boom nose directly from swingaway or jib capacity.

NOTE: All load handling devices and boom attachments are considered part of the load and suitable allowances MUST BE MADE for their combined weights. Weights are for Grove furnished equipment.

FIGURE 5

Tower Crane Load Chart

2-part line

Hook Radius	Maximum Radius with Maximum Load	ft m	16 5	33 10	49 15	66 20	82 25	98 30	115 35	131 40	148 45	164 50	180 55	197 60	213 65	230 70	246 75	262 80	279 85
279 ft 85m	22,045 lbs – 91 ft 10 000 kg – 27.6m	lbs kg	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	20,020 9 080	17,655 7 600	14,330 6 500	12,455 5 650	10,980 4 980	9,765 4 430	8,750 3 970	7,890 3 580	7,165 3 250	6,550 2 970	5,995 2 720	5,510 2 500
262 ft 80m	22,045 lbs – 110 ft 10 000 kg – 33.5m	lbs kg	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	20,990 9 520	18,035 8 180	15,785 7 160	13,975 6 340	12,500 5 670	11,290 5 120	10,520 4 650	9,370 4 250	8,600 3 900	7,935 3 600	
246 ft 75m	22,045 lbs – 130 ft 10 000 kg – 39.6m	lbs kg	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	21,805 9 890	19,115 8 670	16,955 7 690	15,210 6 900	13,755 6 240	12,545 5 690	11,485 5 210	10,580 4 800		
230 ft 70m	22,045 lbs – 150 ft 10 000 kg – 45.7m	lbs kg	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	19,930 9 040	17,945 8 140	16,270 7 380	14,860 6 740	13,670 6 200			
213 ft 65m	22,045 lbs – 161 ft 10 000 kg – 49m	lbs kg	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	21,540 9 770	19,380 8 790	17,590 7 980	16,095 7 300				
197 ft 60m	22,045 lbs – 174 ft 10 000 kg – 52.9m	lbs kg	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	21,120 9 580	19,180 8 700					
180 ft 55m	22,045 lbs – 180 ft 10 000 kg – 55m	lbs kg	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000						
164 ft 50m	22,045 lbs – 164 ft 10 000 kg – 50m	lbs kg	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000							
131 ft 40m	22,045 lbs – 131 ft 10 000 kg – 40m	lbs kg	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000	22,045 10 000									



2 - Part Line

Gear	Capacity	Line Speed	Capacity	Line Speed
1	up to 22,045 lbs	@ 150 fpm	up to 10 000 kg	@ 46 m/min
2	up to 15,740 lbs	@ 206 fpm	up to 7 140 kg	@ 63 m/min
3	up to 11,025 lbs	@ 282 fpm	up to 5 000 kg	@ 86 m/min
4	up to 7,630 lbs	@ 384 fpm	up to 3 460 kg	@ 117 m/min
5	up to 1,320 lbs	@ 430 fpm	up to 600 kg	@ 131 m/min