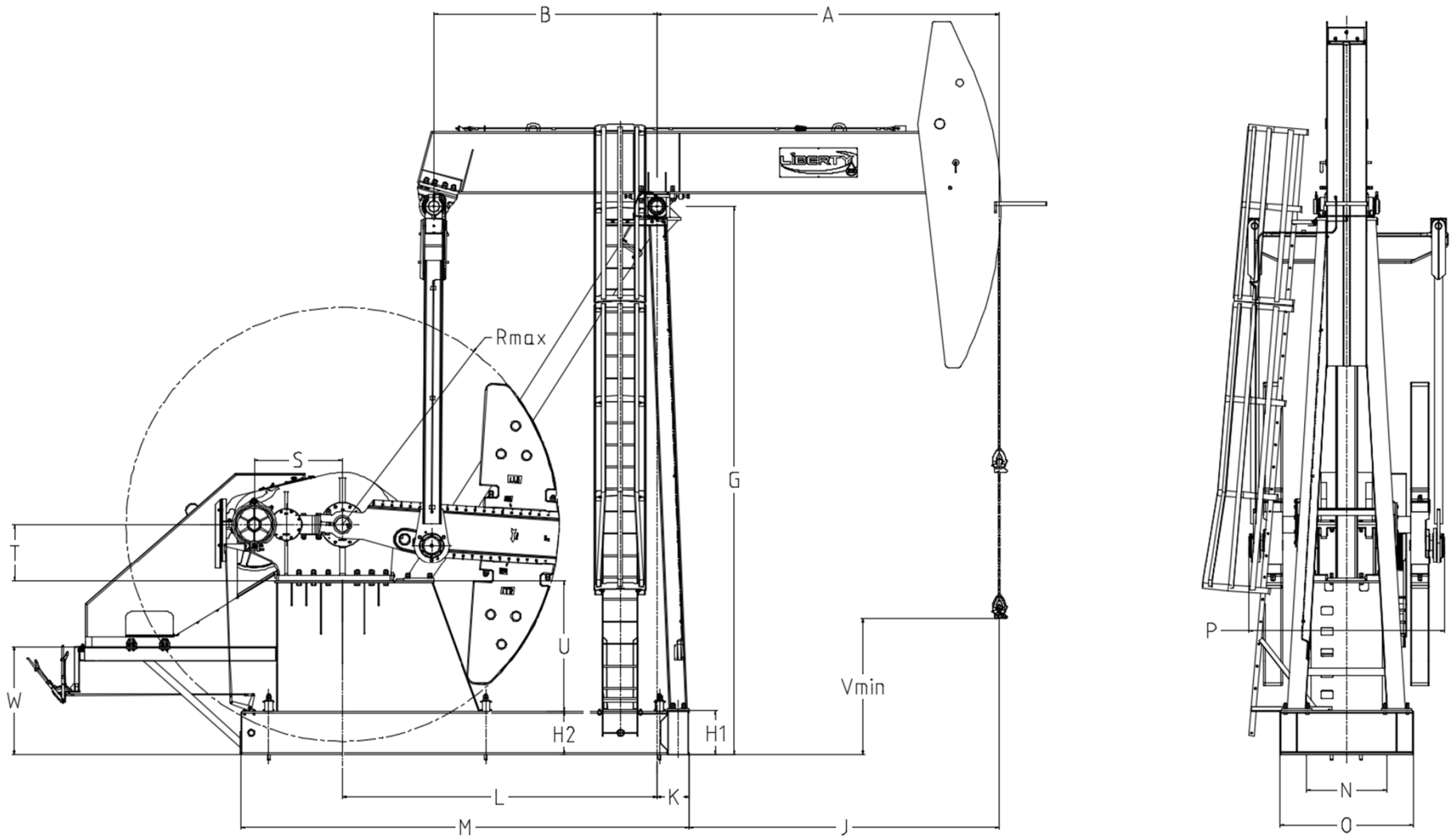
LIBERTY LIFT EG PUMPING UNIT



UNIT	A	B	G	H1	H2	J	K	L	M	N	O	P	R	S	T	U	V	W
912-365-168	15'-5 1/8"	10'-0 5/8"	24'-7 7/8"	23 3/8"	22 7/8"	13'-11 5/8"	1'-5 1/2"	14'-2"	20'-2 3/8"	3'-7 1/4"	6'-0 1/4"	8'-10"	117"	47.768"	30.512"	5'-10 1/2"	6'-0 7/8"	4'-9 7/8"

LIBERTY LIFT SOLUTIONS

TORQUE FACTOR TABLE

UNIT DESIGNATION **912-365-168 EG**

Cranks : **CR055**

Position of Crank degrees	Polished Rod Position Length of Stroke, inches			Torque Factor Length of Stroke, inches		
	168.162	138.910	112.097	168.162	138.910	112.097
0	0.0203	0.0194	0.0186	-25.172	-20.307	-15.963
15	0.0000	0.0000	0.0000	-0.510	-0.007	0.201
30	0.0192	0.0196	0.0196	25.111	20.710	16.479
45	0.0768	0.0767	0.0757	48.093	39.274	31.095
60	0.1658	0.1648	0.1623	64.963	53.316	42.460
75	0.2750	0.2740	0.2708	74.106	61.625	49.685
90	0.3929	0.3936	0.3911	76.272	64.463	52.751
105	0.5100	0.5143	0.5144	73.545	63.044	52.278
120	0.6204	0.6295	0.6332	68.018	58.749	49.094
135	0.7211	0.7346	0.7421	61.084	52.593	43.884
150	0.8102	0.8268	0.8369	53.293	45.022	37.018
165	0.8864	0.9034	0.9138	44.396	35.907	28.523
180	0.9473	0.9608	0.9687	33.284	24.609	18.188
195	0.9879	0.9942	0.9971	17.878	10.216	5.798
210	0.9995	0.9971	0.9943	-4.192	-7.709	-8.435
225	0.9716	0.9637	0.9571	-32.092	-27.840	-23.439
240	0.9003	0.8929	0.8857	-58.606	-46.754	-37.356
255	0.7937	0.7904	0.7849	-76.682	-61.053	-48.328
270	0.6663	0.6665	0.6631	-85.575	-69.399	-55.269
285	0.5309	0.5324	0.5301	-87.424	-72.114	-57.927
300	0.3968	0.3978	0.3957	-83.945	-69.934	-56.490
315	0.2718	0.2715	0.2692	-75.907	-63.394	-51.246
330	0.1628	0.1614	0.1591	-63.451	-52.766	-42.476
345	0.0766	0.0750	0.0733	-46.488	-38.252	-30.522

1.) The position of the crank is the angular displacement measured clockwise from the 12 o'clock position View with the well head to the right.

2.) Position is expressed as a fraction of stroke above lowermost position.

3.) Torque factor = T/P_R, where T = torque on pumping unit reducer due to polished rod load P_R.

Strctural Unbalance = -476

A =	185.091
C =	120.630
G =	123.898
H =	295.898
K =	241.835
I =	170.000
P =	183.320
R1 =	49.500
R2 =	42.000
R3 =	34.500

LIBERTY LIFT SOLUTIONS

EFFECTIVE COUNTERBALANCE TABLE

Unit Designation 912-365-168 EG

CRANK : CR055

Stroke Length, inches	168.162		138.910		112.097	
Cranks Only, pounds	7371		8808		10870	
Description	Max	Min	Max	Min	Max	Min
Cranks and 4 each LL2	17297	9871	20553	11767	25222	14485
Cranks w/2-LL2 & 2-LL3	20270	10913	24071	13000	29521	15992
Cranks and 4 each LL3	23243	11955	27588	14233	33819	17498
Cranks w/2-LL3 & 2-LL4	25381	12850	30118	15292	36911	18792
Cranks and 4 each LL4	27519	13745	32648	16350	40003	20086
*Cranks w/2-LL4 & 2-LL5	29235	14521	34678	17268	42484	21208
*Cranks and 4 each LL5	30951	15296	36708	18185	44964	22329
*Cranks w/2-LL5 & 2-LL6	33663	17058	39917	20270	48886	24877
*Cranks and 4 each LL6	36375	18820	43126	22355	52807	27424

* Not Recommended

** Maximum recommended ECB for this unit is 29200 in maximum stroke position.

LIBERTY LIFT SOLUTIONS,LLC GEAR REDUCER DATA SHEET

MANFACTURED BY: Dwang Jinai DATE SUBMITTED : November 1, 2014

NOMINAL API REDUCER SIZE : 912

CALCULATED VALUES

PITTING RESISTANCE TORQUE

First reduction 1,378,463 in-lb

Second reduction 1,328,722 in-lb

STATIC TORQUE

First reduction :

Gear 1,595,258 in-lb Pinion 2,083,148 in-lb

Second reduction:

Gear 1,331,170 in-lb Pinion 1,628,437 in-lb

BENDING STRENGTH TORQUE

First reduction :

Gear 1,884,846 in-lb Pinion 2,225,015 in-lb

Second reduction:

Gear 1,457,483 in-lb Pinion 1,620,663 in-lb

Notes:

1. First reduction is high-speed reduction.
2. Seond reduction is the slow-speed reduction.

CONSTRUCTION FEATURES

TYPE OF REDUCER : Double Reduction, Double Helical, Involute gearing

TEETH

Number of teeth and normal diametral pitch or transverse diametral pitch

First reduction, Np=18 Ng=95 Pnd=3.6286 Pd=3.2616

Second reduction, Np=21 Ng=118 Pnd=2.5400 Pd=2.2828

Center distance ans net face width

First reduction, CD=17.323 in F=8.661 in

Second reduction, CD=30.445 in F=14.906 in

Helix angle and normal pressure angle or transverse pressure angle

First reduction, HA=25.99 deg NPA=20 deg

Second reduction, HA=26.01 deg NPA=20 deg

Geometry factors I and J for the pinion and gear

First reduction, I=.2535 Jp=.5476 Jg=.5141

Second reduction, I=.2539 Jp=.5544 Jg=.5476

Manufacturing methods

Teeth generated by hobbing process Teeth finished by hobbing process

Tooth hardening method through hardened

Gear and pinion materials and hardness.

First reduction

Gear material	Normalized Ductile Iron	Hardness	BHN 245 - 275
Pinion material	Q and T AISI4140	Hardness	BHN 285 - 315

Second reduction

Gear material	Normalized Ductile Iron	Hardness	BHN 260 - 300
Pinion material	Q and T AISI4140	Hardness	BHN 300 - 330

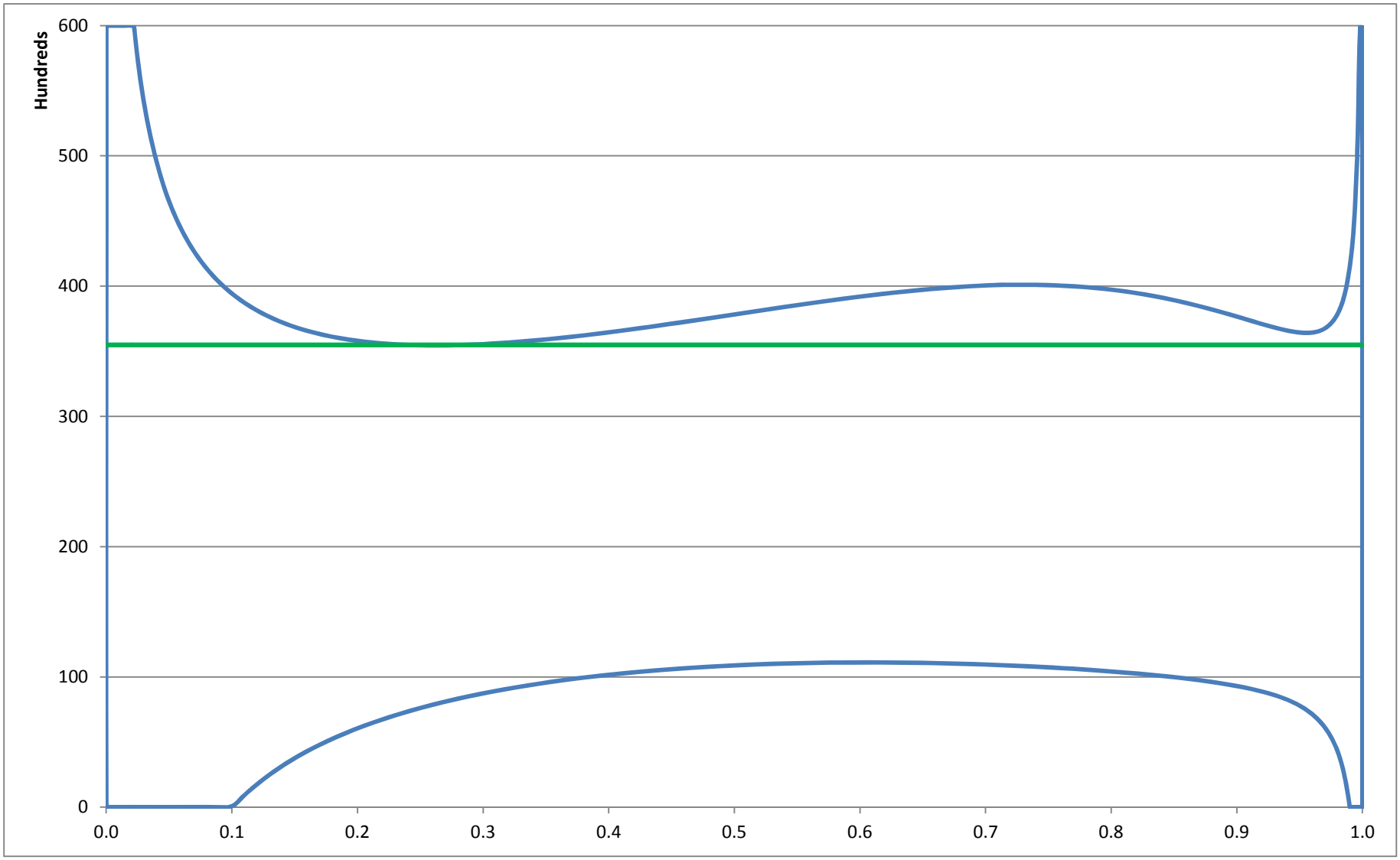
Other components

Crankshaft material	Q and T AISI4140	Hardness	BHN 300 - 330
Housing material	Cast Iron		
Housing type	Split Type		

Bearing Sizes		Bearing Life, L10	
High speed pinion	NU2324	High speed pinion	>135,000 hours
Intermediate speed pinion	NU2328	Intermediate speed pinion	>135,000 hours
Low speed shaft	NU2244	Low speed shaft	>120,000 hours

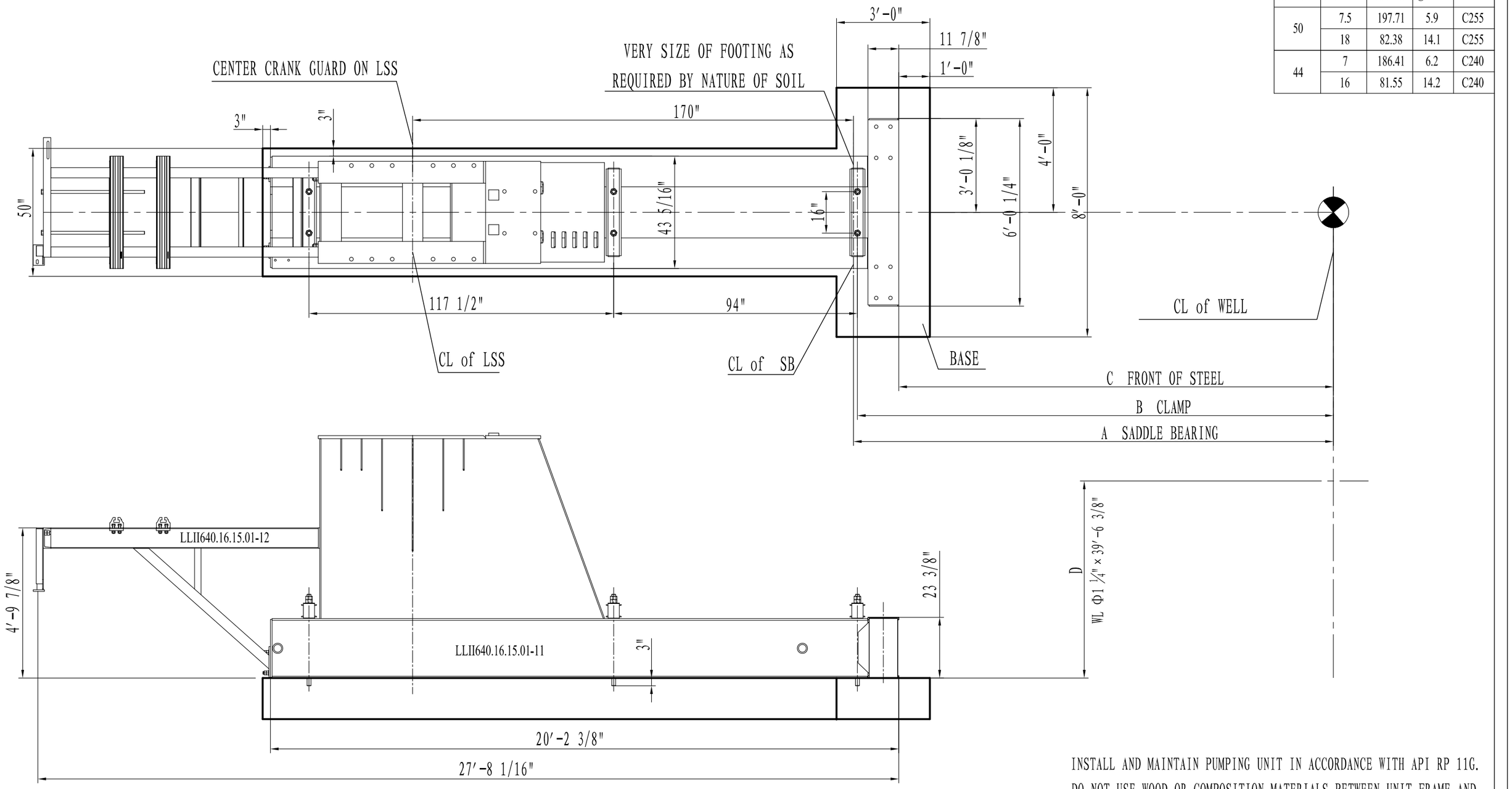
912-365-168 EG

Calculated Permissible Load with 1924230 in-lb Moment



CRANK CR055

912				
B/G LLII912.16.15.01-14 (71.9-81.2)				
RDCR SHEAVE	PM SHEAVE	OVERALL RATIO	SPM @1160	V-BELT
50	7.5	197.71	5.9	C255
	18	82.38	14.1	C255
44	7	186.41	6.2	C240
	16	81.55	14.2	C240



UNIT	A	B	C	D	E	F
EG 912-365-168	15'-5 1/8"	15'-3 5/8"	167.61"	6'-0 7/8"		

INSTALL AND MAINTAIN PUMPING UNIT IN ACCORDANCE WITH API RP 11G. DO NOT USE WOOD OR COMPOSITION MATERIALS BETWEEN UNIT FRAME AND CONCRETE FOUNDATION.

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LIBERTY LIFT
1250 Wood Branch Park Dr
Suite 250
Houston, TX 77079

TOLERANCES:
a. X.X: ±3
b. X.XX: ±1
c. X.XXX: ±0.25
d. ANGULAR: ±1°

SURFACE FINISH:
a. X.X: 25
b. X.XX: 6.3
c. X.XXX: 3.2

DRAWN		STANDARD	
CHECKED		APPROVAL	
DATE			

PART NUMBER CHINA	LL50015	DRAWING NUMBER US		REV	
TITLE	FOUNDATION, HP		WEIGHT		
MATERIAL	ASSEMBLY		SCALE	1:36	
DRAWING NUMBER CHINA	LLB1.09		REV	0	