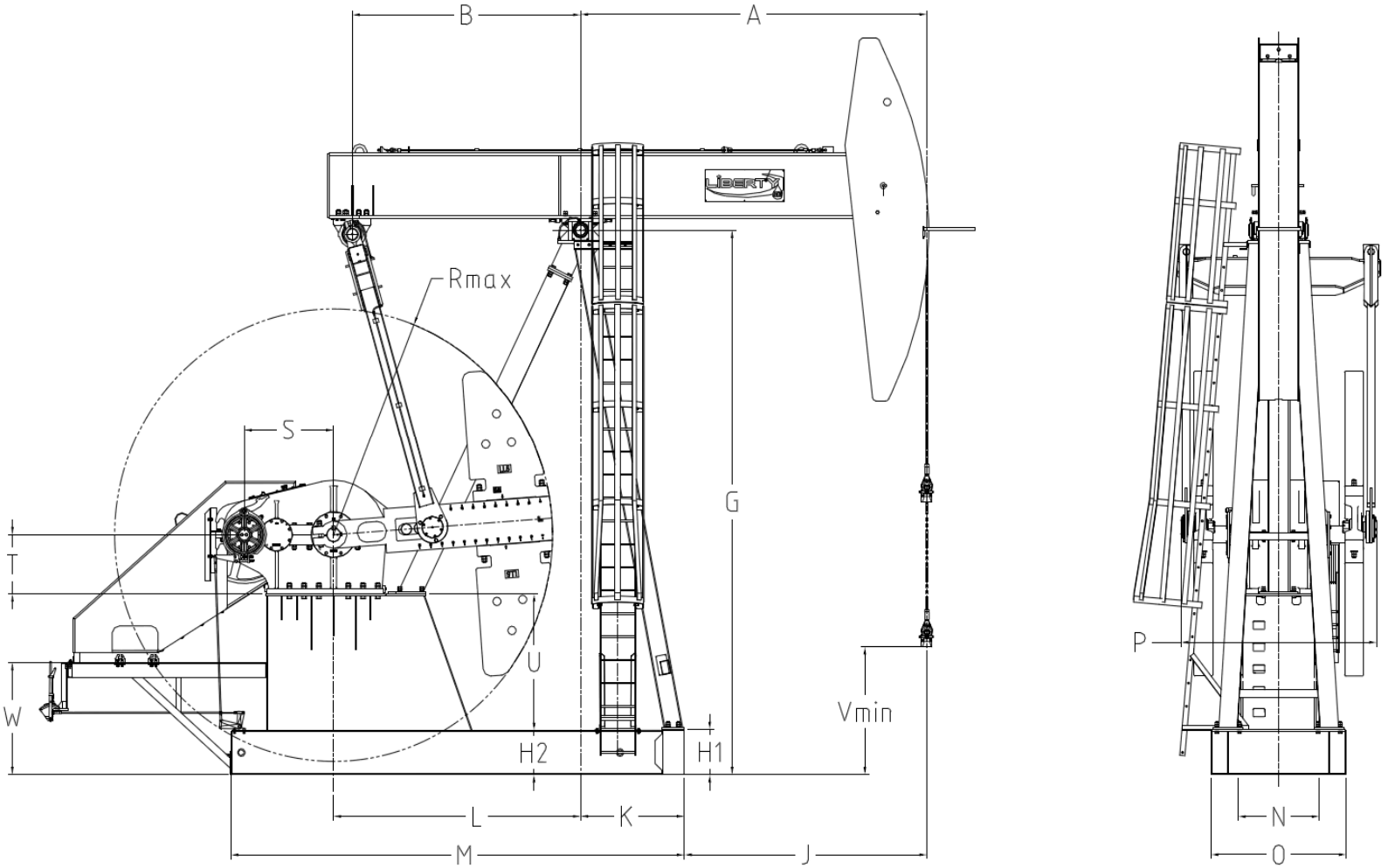
LIBERTY LIFT HE PUMPING UNIT



UNIT	A	B	G	H1	H2	J	K	L	M	N	O	P	R	S	T	U	V	W
1280-427-192	17'-7 1/2"	10'-21 3/4"	27'-1 3/8"	27 1/2"	27 1/2"	13'-1/8"	4'-7 3/8"	11'-0"	19'-5 1/4"	3'-10 7/8"	6'-5 1/8"	9'-8 5/8"	125"	54.917"	32.874"	5'-8 7/8"	7'-2 3/4"	4'-11 7/8"

LIBERTY LIFT SOLUTIONS

TORQUE FACTOR TABLE

UNIT DESIGNATION 1280-427-192 High Efficiency

Cranks : CR006

Position of Crank degrees	Polished Rod Position Length of Stroke, inches			Torque Factor Length of Stroke, inches		
	192.094	164.796	138.451	192.094	164.796	138.451
0	0.0026	0.0020	0.0016	-11.111	-8.234	-5.984
15	0.0097	0.0104	0.0110	21.777	18.980	16.037
30	0.0616	0.0617	0.0615	53.697	45.016	36.889
45	0.1529	0.1506	0.1480	78.711	65.709	53.702
60	0.2711	0.2661	0.2607	92.854	78.240	64.498
75	0.4010	0.3947	0.3878	96.173	82.335	68.861
90	0.5297	0.5242	0.5177	91.605	79.730	67.717
105	0.6487	0.6457	0.6413	82.525	72.728	62.533
120	0.7536	0.7539	0.7525	71.271	63.136	54.617
135	0.8424	0.8455	0.8467	58.895	51.922	44.801
150	0.9137	0.9181	0.9209	45.434	39.312	33.436
165	0.9655	0.9695	0.9722	30.234	25.046	20.555
180	0.9949	0.9966	0.9977	12.336	8.723	6.137
195	0.9976	0.9961	0.9946	-8.847	-9.693	-9.571
210	0.9696	0.9651	0.9612	-32.450	-29.318	-25.772
225	0.9093	0.9033	0.8977	-55.629	-48.219	-41.116
240	0.8198	0.8135	0.8072	-74.879	-64.120	-54.072
255	0.7080	0.7020	0.6954	-88.065	-75.407	-63.434
270	0.5827	0.5767	0.5700	-94.814	-81.446	-68.540
285	0.4523	0.4461	0.4391	-95.546	-82.211	-69.151
300	0.3248	0.3183	0.3113	-90.618	-77.800	-65.214
315	0.2079	0.2016	0.1953	-80.001	-68.186	-56.718
330	0.1095	0.1045	0.0997	-63.324	-53.240	-43.712
345	0.0382	0.0353	0.0327	-40.227	-33.005	-26.502

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 = -1540

A =	211.500
C =	121.732
G =	129.331
H =	325.315
K =	236.296
I =	132.008
P =	197.375
R1 =	53.031
R2 =	46.023
R3 =	39.016

LIBERTY LIFT SOLUTIONS

EFFECTIVE COUNTERBALANCE TABLE

Unit Designation 1280-427-192 High Efficiency

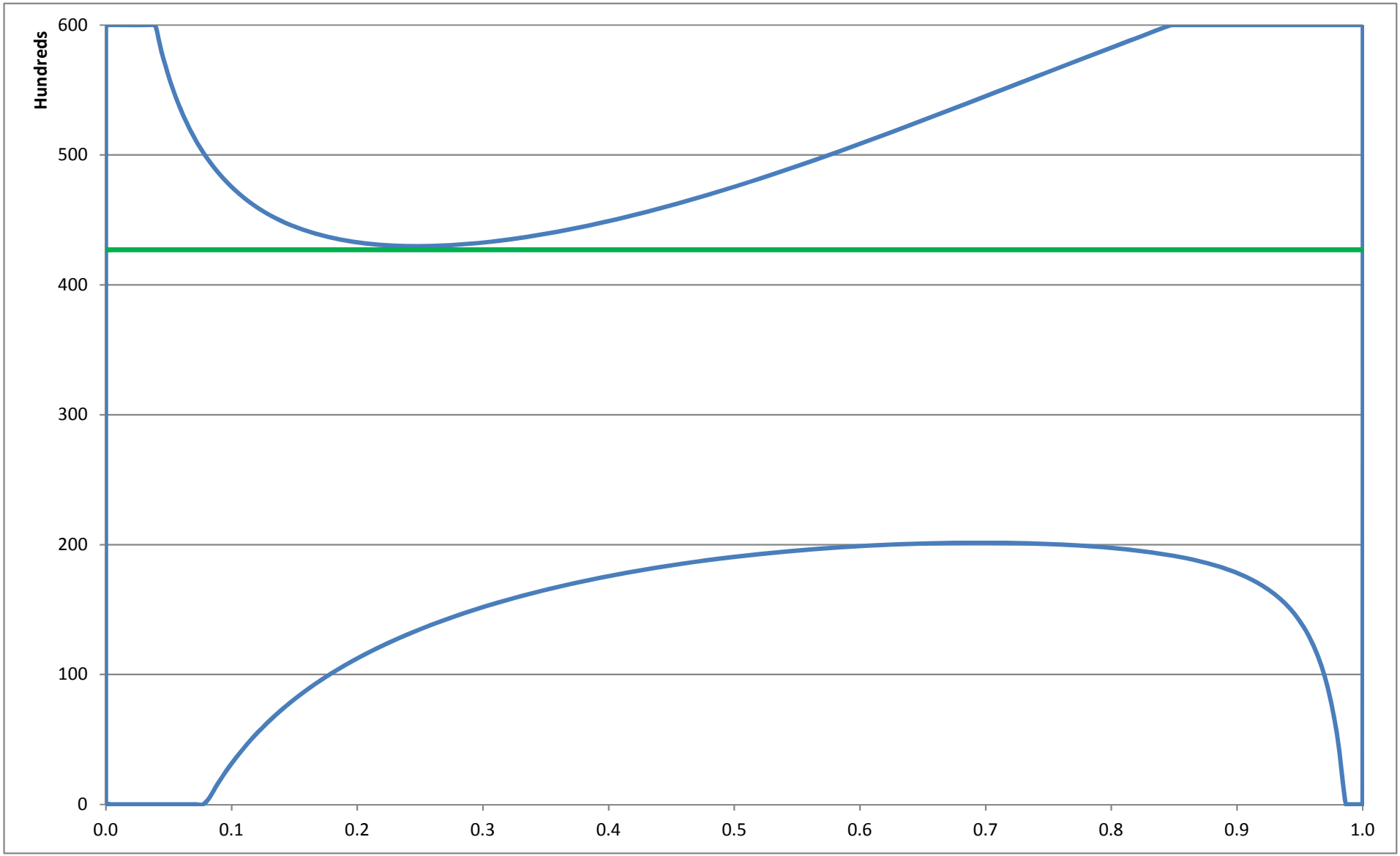
CRANK : CR006

Stroke Length, inches	192.094		164.796		138.451	
Cranks Only, pounds	4387		5270		6478	
Description	Max	Min	Max	Min	Max	Min
Cranks and 4 each LL3	18955	9897	22008	11600	26185	13931
Cranks w/2-LL3 & 2-LL4	20944	10909	24293	12763	28875	15300
Cranks and 4 each LL4	22932	11920	26577	13925	31565	16669
Cranks w/2-LL4 & 2-LL5	24539	12797	28423	14932	33738	17855
Cranks and 4 each LL5	26145	13673	30268	15939	35911	19040
Cranks w/2-LL5 & 2-LL6	28714	15552	33220	18098	39386	21582
Cranks and 4 each LL6	31283	17431	36171	20257	42861	24124
Cranks w/2-LL6 & 2-LL7	33105	19107	38265	22182	45326	26390
*Cranks and 4 each LL7	34927	20782	40358	24106	47790	28656

* Not Recommended

** Maximum recommended ECB for this unit is 34160 in maximum stroke position.

1280-427-192 High Efficiency
Calculated Permissible Load with 3301943 in-lb Moment



LIBERTY LIFT SOLUTIONS,LLC GEAR REDUCER DATA SHEET

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

NOMINAL API REDUCER SIZE : 1280

CALCULATED VALUES

PITTING RESISTANCE TORQUE

First reduction 2,034,487 in-lb

Second reduction 1,890,791 in-lb

STATIC TORQUE

First reduction :

Gear 2,056,175 in-lb Pinion 2,661,473 in-lb

Second reduction :

Gear 1,885,187 in-lb Pinion 2,160,818 in-lb

BENDING STRENGTH TORQUE

First reduction :

Gear 2,402,675 in-lb Pinion 2,811,414 in-lb

Second reduction :

Gear 1,963,826 in-lb Pinion 2,098,164 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 = 21 Ng = 115 Pnd = 3.6286 Pd = 3.1750

Second reduction, Np = 21 Ng = 113 Pnd = 2.3091 Pd = 2.000

Center distance ans net face width :

First reduction, CD = 21.4173 in F = 9.0175 in

Second reduction, CD = 33.500 in F = 16.929 in

Helix angle and normal pressure angle or transverse pressure angle.

First reduction, HA = 28.955 deg NPA = 20 deg

Second reduction, HA = 29.987 deg NPA = 20 deg

Geometry factors I and J for the pinion and gear.

First reduction, I = .2598 Jp = .5517 Jg = .5226

Second reduction, I = .2505 Jp = .5254 Jg = .5264

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 - 285

Pinion material Q and T AISI4145 Hardness BHN 285 - 325

Second reduction,

Gear material Normalized Ductile Iron Hardness BHN 270 - 310

Pinion material Q and T AISI4145 Hardness BHN 300 - 340

Other components

Crankshaft material Q and T AISI4140 Hardness BHN 285 - 325

Housing material Cast Iron

Housing type Split Type

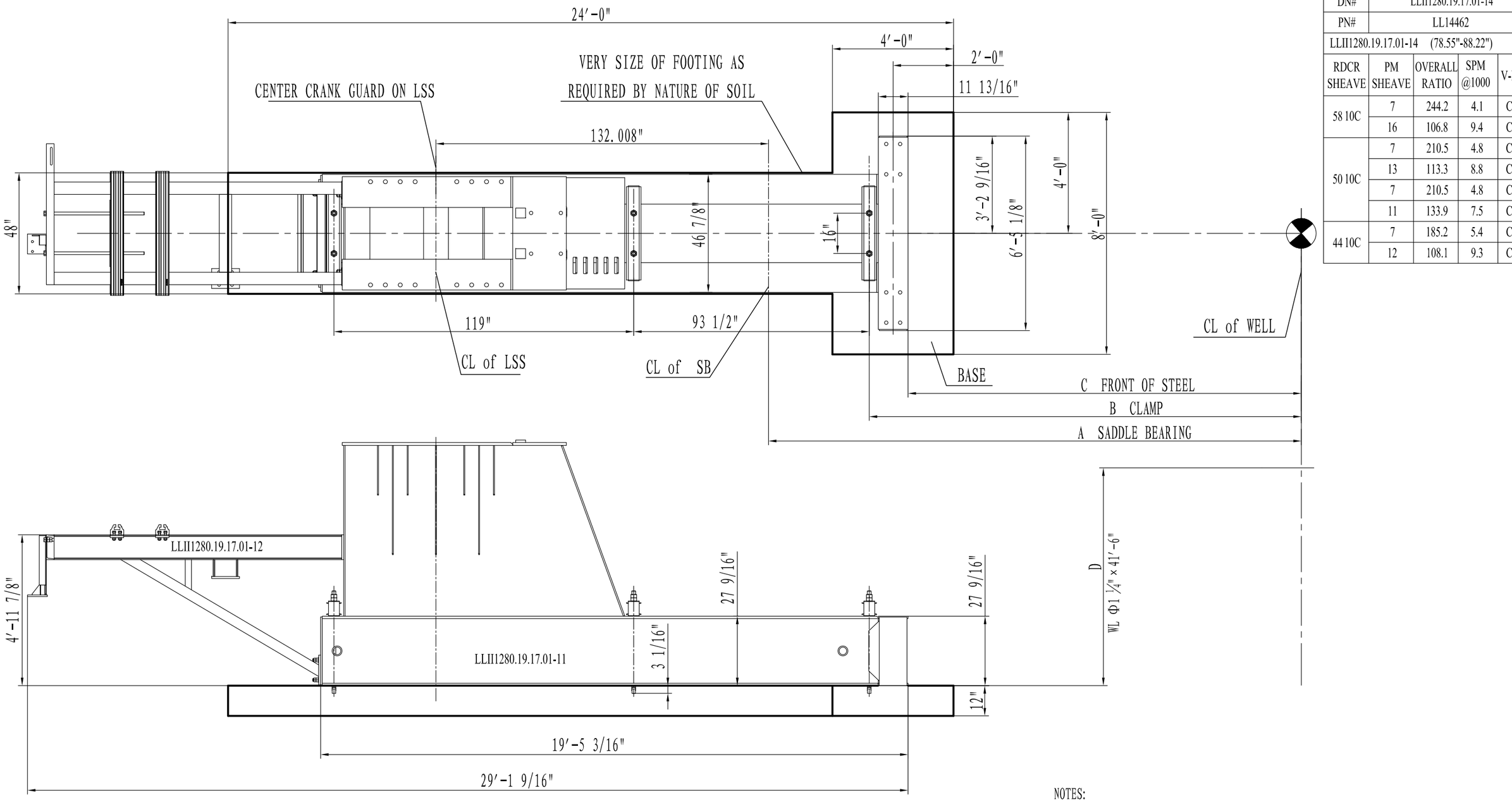
Bearing Sizes

High speed pinion	NU2326
Intermediate speed pinion	NU3234
Low speed shaft	NJ2248

Bearing Life, L10

High speed pinion	>135,000 hours
Intermediate speed pinion	>135,000 hours
Low speed shaft	>120,000 hours

1280 B/G				
DN#	LLII1280.19.17.01-14			
PN#	LL14462			
LLII1280.19.17.01-14 (78.55"-88.22")				
RDCR SHEAVE	PM SHEAVE	OVERALL RATIO	SPM @1000	V-BELT
58 10C	7	244.2	4.1	C285
	16	106.8	9.4	C285
50 10C	7	210.5	4.8	C270
	13	113.3	8.8	C270
	7	210.5	4.8	C255
	11	133.9	7.5	C255
44 10C	7	185.2	5.4	C255
	12	108.1	9.3	C255



UNIT	A	B	C	D	E	F	CRANK
1280-427-192	17'-7 1/2"	14'-3 1/2"	13'-0 1/8"	7'-2 3/8"			CR006

NOTES:

1. INSTALL AND MAINTAIN PUMPING UNIT IN ACCORDANCE WITH API RP 11G. DO NOT USE WOOD OR COMPOSITION MATERIALS BETWEEN UNIT FRAME AND CONCRETE FOUNDATION.
2. USE WITH FOUNDATION CLAMP DN# LLII1280.19.17.01-1601, PN# LL16151.

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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	LL50063	DRAWING NUMBER US		REV
TITLE	FOUNDATION, HE, HP		WEIGHT	
MATERIAL	ASSEMBLY		SCALE	1:38
DRAWING NUMBER CHINA	LLB1.24		REV	0