

**LIFT STATION CALCULATIONS
FOR
HOWEY SELF STORAGE**

7/18/2005
Revised 8/23/21

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System Capacity

Peak Flow from Office and Single Family Residence

$$\begin{aligned} Q &= \text{Average Flow} = 300 \text{ gpd} = 0.2 \text{ gpm} \\ &\quad \text{Residential Unit} = 0 \text{ gpd} \\ &\quad \text{Office} = 300 \text{ gpd} \\ PF &= \text{Peak Factor} = 4 \\ \text{Peak Flow} &= (PF)(Q) = 0.8 \text{ gpm} \end{aligned}$$

Peak Flow to maintain minimum velocity in 4" PVC = 100 gpm

Total Dynamic Head

Static Head = Highest point in system(pt. of connect.) - Min. Water Level

$$= 95.00 - 81.00 = 14.0 \text{ ft}$$

System Head = 30.0 ft (Assumed)

Friction Head (ft) = $0.002083(L)(100/C)^{1.85}(Q)^{1.85}/(D)^{4.8655}$ (Hazen Williams)

$$\text{Length(ft)} = 110$$

$$C = 130$$

$$D \text{ (in)} = 4$$

Length = Pipe Length + Equivelant Pipe Length for Joints/valves

45 Bends	0 bends	5 ft/bend =	0 feet
Plug Valve	1 valves	25 ft/valve =	25 feet
ARV	0 valves	25 ft/valve =	0 feet
G.V.	0 valves	25 ft/valve =	0 feet
Check V.	1 valves	25 ft/valve =	25 feet
Lift St. fitt.			100 feet
Total =			150 feet

Flow(gpm)	Static Head (ft)	System Head(ft)	Friction Head (ft) 4" PVC	T.D.H.(ft)
50	14.0	30.0	0.2	44.2
100	14.0	30.0	0.8	44.8
150	14.0	30.0	1.8	45.8
200	14.0	30.0	3.0	47.0
250	14.0	30.0	4.5	48.5

TDH = Static Head + System Head + Friction Head

Basin/Cycle Time

Tank : Diameter = 4.0 ft Working Depth (D) = 1.0 ft

Minimum Cycle Time = 10.0 min

Required Volume = Min. Cycle Time x Average Flow = 2.1 gal

Provided Volume = $((3.14)(\text{Dia})^2)/4 \cdot D =$ 94.0 gal

Average Flow = 0.2 gpm

Cycle Time = Volume/avg. flow = 451.2 min

Pump Run Time = Volume/Peak Discharge = 0.8 min

Available storage above high water alarm = $((3.14)(\text{Dia})^2)/4 \cdot 5.25 =$ 493.2 gal

Pump Selection

Operating Conditions (Condition 1) = 118.0 gpm @ 45.1 ft

Manufacturer Name: HOMA

Model No.: GRP34/1/C

Horsepower: 4.0 hp

BUOYANCY/FLOATATION

Buoyancy (Fb)

$$F_b = [(3.14)(6.0 \text{ ft})^2/4](88.25-78.00 \text{ ft})(62.4 \text{ pcf}) = 18084 \text{ lb}$$

Weight (W)

$$\begin{aligned} W &= W_{\text{Concrete}} + W_{\text{Soil}} = 26873 \text{ lb} \\ W_{\text{Concrete}} &= (2.33 \text{ cy})(150 \text{ lb/cf})(27 \text{ cf/cy}) = 9437 \text{ lb} \\ W_{\text{Soil}} &= [(3.14)(6.0 \text{ ft})^2/4 - (3.14)(4.0 \text{ ft})^2/4](88.25 - 79.00)(120 \text{ lb/cf}) = 17436 \text{ lb} \end{aligned}$$

$$18084 \text{ lb} < 26873 \text{ lb}$$

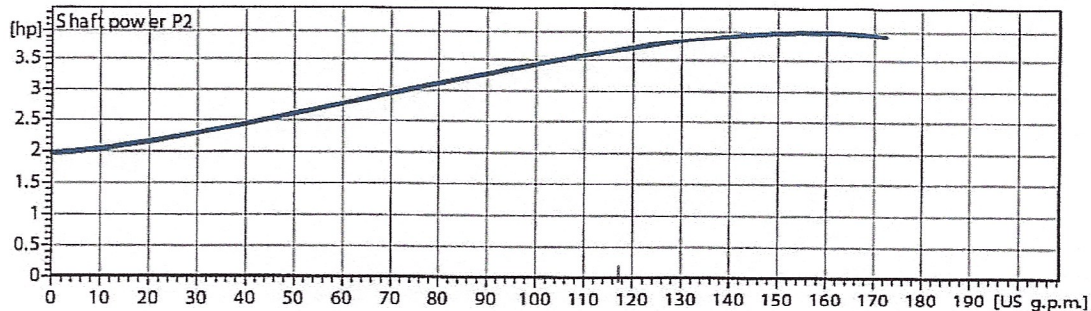
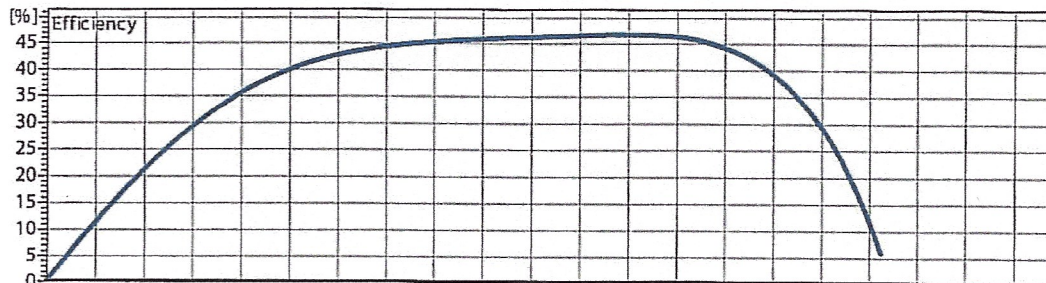
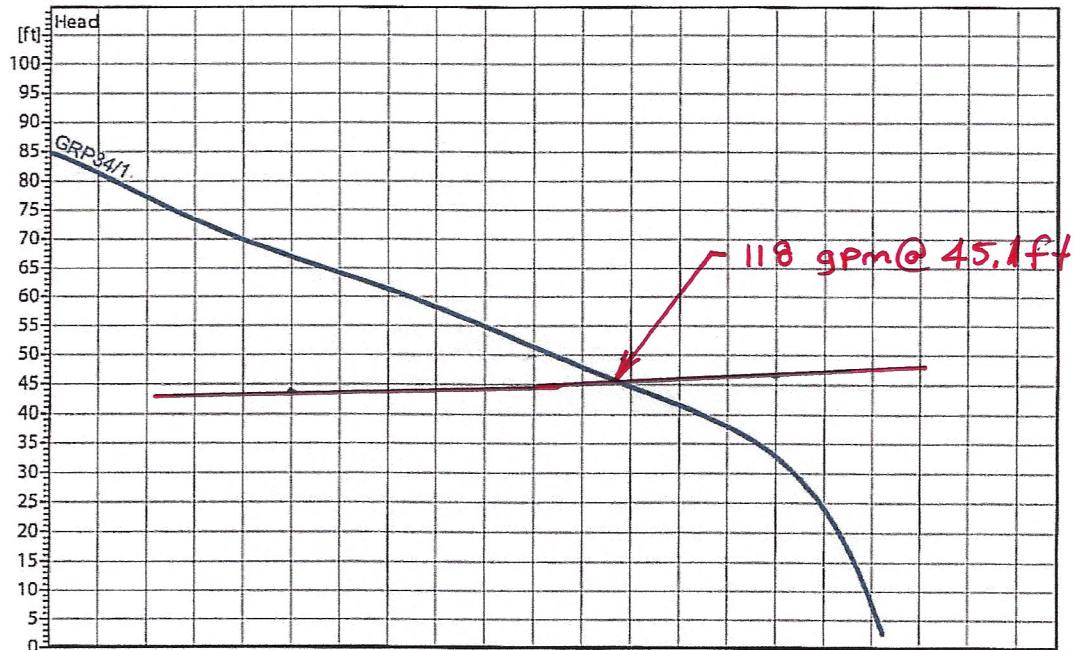
$$F.S. = 26873 / 18084 = 1.5$$

Performance Curve

GRP34/1/C

Impeller					
Impeller type: vane impeller with cutter sys.	Solid size	Ø:	Max. Ø:	Min. Ø:	Sel. Ø:
			6 ⁵ / ₁₆ "	4 ¹³ / ₁₆ "	5 ⁷ / ₈ "
Operating data					
Speed: 3450 rpm	Frequency: 60 Hz	Duty point: Q = 100 US g.p.m. H = 50.2 ft		Suction port:	Discharge port: 2" M
Power data referred to:		Water [100%] ; 68°F; 62.322lb/ft³; 1.0818E-5ft²/s		Testnorm:	ISO 9906

Curve number:



2.0 - 29.01.2009 (Build 168)

Project	Project no.:	Created by:	Page: 2	Date: 2009-08-04
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