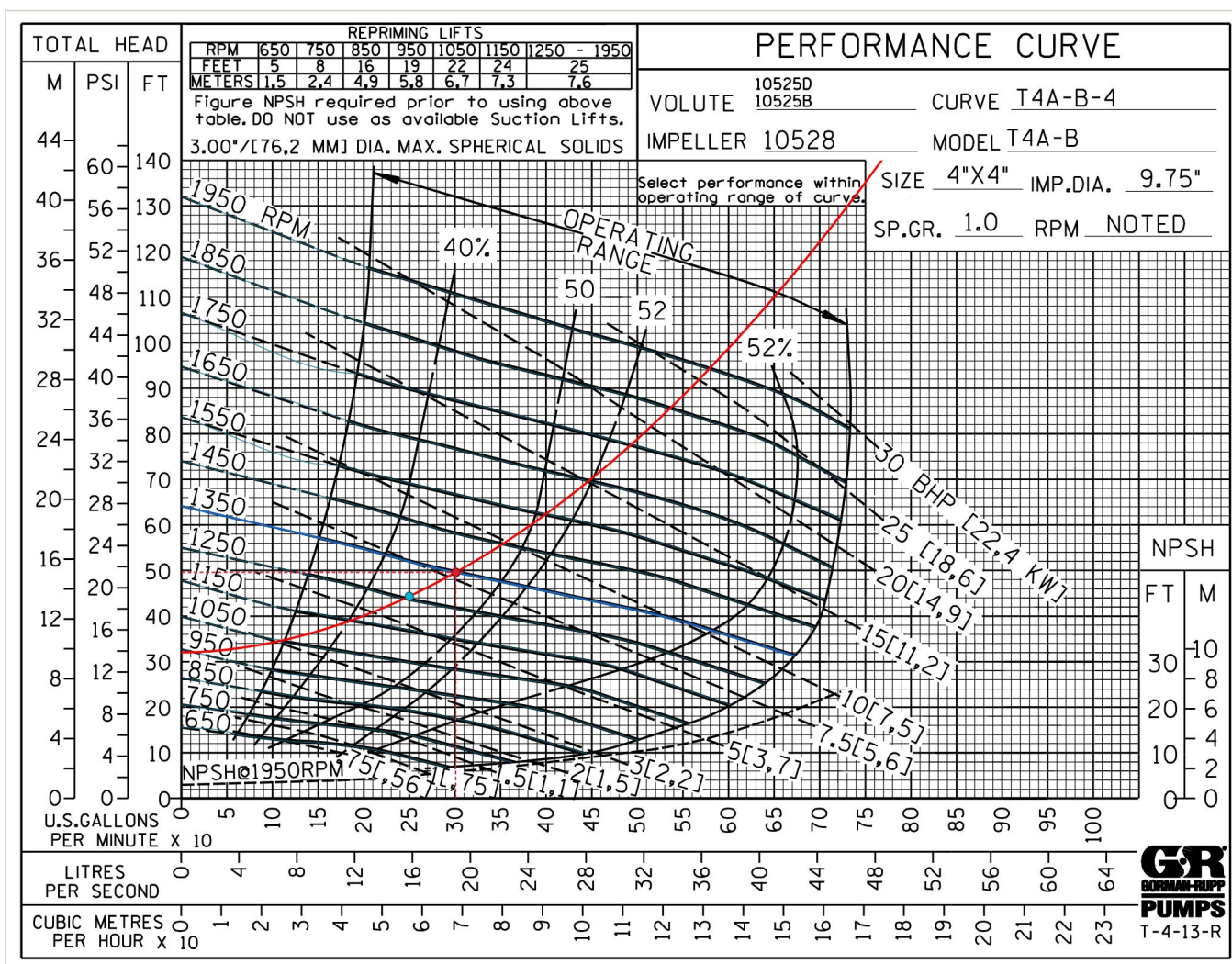


Gorman-Rupp, T4A60S-B /F, 1350 RPM Pump Speed

FLUID	SG	VISCOSITY
Industrial wastewater <2% wt at 59 deg F	1.00	1.4 cP (1.4 cSt)

CAPACITY	TOTAL HEAD	TOTAL STATIC	NPSHA
250 USgpm	44.3 ft	32 ft	19.04 ft

CAPACITY	TOTAL HEAD	TOTAL STATIC	NPSH
301 USgpm	49.6 ft	32 ft	8.61 ft Surplus



— Pump
 — System
 ● Target System Duty
 ● Calculated duty

FLUID

Fluid	Industrial wastewater <2% wt at 59 deg F
Specific gravity	1.00
Density	1001 kg/m3
Dynamic viscosity	1.36 cP
Kinematic viscosity	1.36 cSt (~ 33 SSU)
Pump curve basis	Published water curve (viscosity < 10 cSt)
Vapor pressure	0.25 psi abs
Site altitude	1000 ft
Atmospheric pressure	14.17 psi

SUCTION

Datum	Pump suction centerline = 0
Static suction lift	12 ft (surface below pump)

Suction Segment 1

4" Sch 40, Commercial steel: 15 ft
1 x 4" Inlet, sharp-edged
1 x 4" 90 deg elbow, standard (r/D ~ 1)

DISCHARGE

Static discharge head	20 ft
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Discharge Segment 1

4" Sch 40, Commercial steel: 250 ft
4 x 4" 90 deg elbow, long-radius (r/D ~ 1.5)
1 x 4" Gate valve, full open
1 x 4" Swing check valve
1 x 4" Outlet, discharge to tank / atmosphere

FRICTION LOSS @ 301 USGPM

Segment	V (m/s)	Re	f	K	Head (ft)
Suction Segment 1 (suct)	2.31	174k	0.0189	0.84	1.5
Discharge Segment 1 (disch)	2.31	174k	0.0189	3.91	16.07

TOTAL HEAD @ 301 USGPM

Static suction lift	+ 12 ft
Surface below pump centerline	
Suction friction	+ 1.5 ft
Pipe + fittings on the suction line at duty	
TDSL	= 13.5 ft
Total dynamic suction lift	
Static discharge head	+ 20 ft
Discharge surface relative to pump centerline	
Discharge friction	+ 16.07 ft
Pipe + fittings on the discharge line at duty	
TDDH	= 36.07 ft
Total dynamic discharge head	
Total head	= 49.57 ft
TDSL + TDDH	

NPSH @ 301 USGPM

Calculated at 301 USgpm. Atmospheric head uses site altitude and specific gravity. Vapor pressure is from the fluid and temperature.

Atmospheric head at altitude	+ 32.65 ft
Altitude 1000 ft	
Vapor pressure correction	- 0.57 ft
From fluid type and temperature	
Total dynamic suction lift	- 13.5 ft
Static lift + suction losses at duty	
NPSHa	= 18.58 ft
NPSHr	8 ft
Safety margin	1.97 ft
per ANSI/HI 9.6.1 (General industrial / water, POR; greater of NPSHr x 1.05 or NPSHr + 0.6 m); NPSHr + 0.6 m governed	
Required NPSH	9.97 ft
NPSHr + margin	
NPSH surplus	8.61 ft
Pass	

METHODS

- Friction: Darcy-Weisbach with the Churchill (1977) friction factor, laminar through fully rough.
- Fittings: Darby 3-K method. Area-change K from Crane TP-410.
- Pump head is independent of specific gravity. The published water curve is used below 20 cSt (~100 SSU).
- System curve: $H(Q)$ = total static + pipe friction + fitting losses on suction and discharge.
- NPSHa = atmospheric head at site altitude - vapor-pressure head - total dynamic suction lift at duty. Pump centerline is the datum.

CHECKS

WARN Suction lift entered - check NPSHa on the NPSH tab.

PUMP & FLUID

Type
Self-priming centrifugal

Fluid
Industrial wastewater <2% wt

Temperature
59 deg F

Specific gravity
1.00

Kinematic viscosity
1.36 cSt

Total static
32 ft

SUCTION

Static suction lift
12 ft

4" Sch 40, Commercial steel, 15 ft

1 x 4" Inlet, sharp-edged

1 x 4" 90 deg elbow, standard (r/D 1)

DISCHARGE

Static discharge head
20 ft

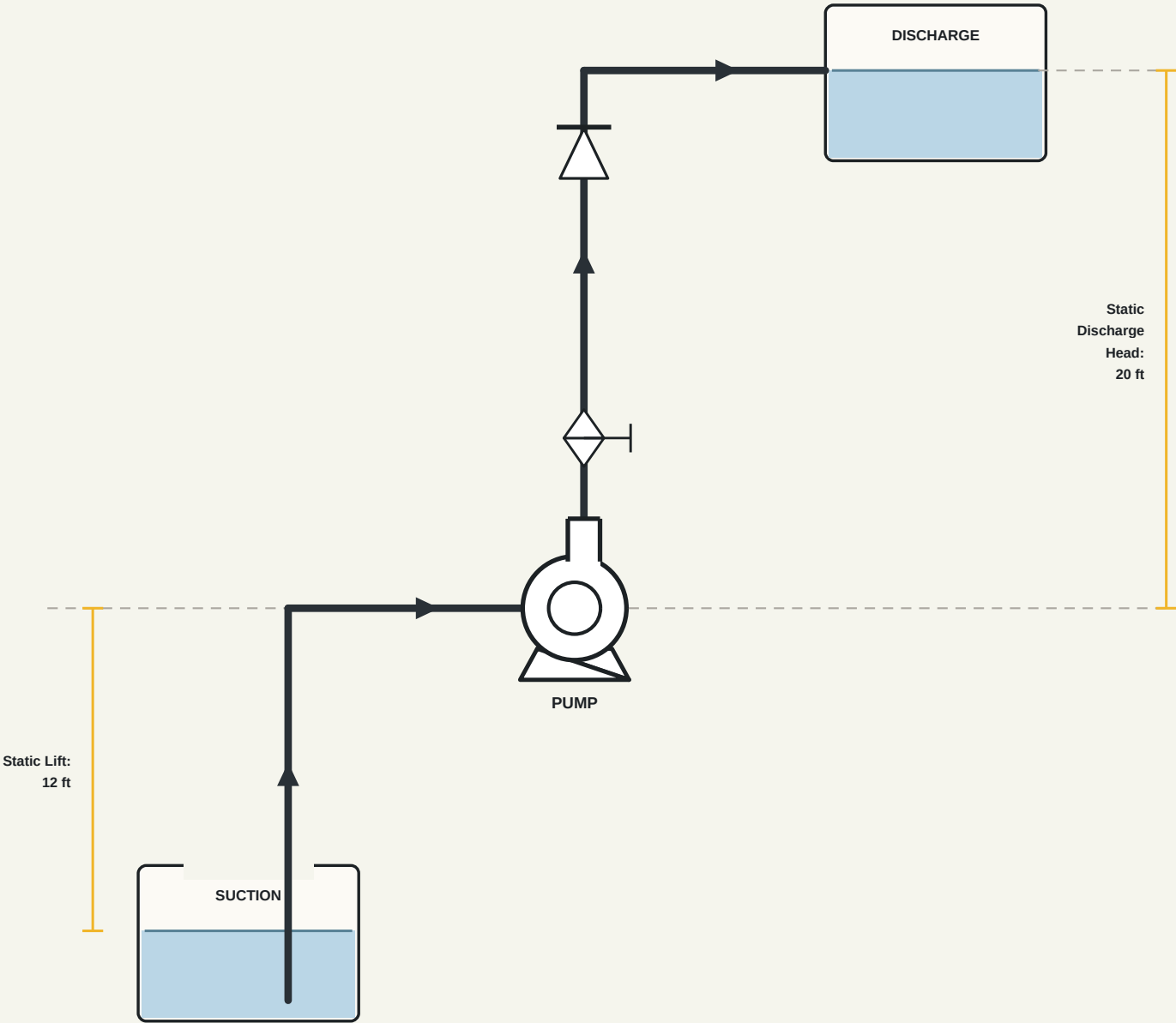
4" Sch 40, Commercial steel, 250 ft

4 x 4" 90 deg elbow, long-radius (r/D 1.5)

1 x 4" Gate valve, full open

1 x 4" Swing check valve

1 x 4" Outlet, discharge to tank / atmosphere



Static lift / head is liquid surface to pump CL. Elevations approximately to scale; pipe lengths and fittings are not.