

ANSI/ASP-7 2006 Specifies three methods for determining the maximum system flow rate. The following simplified TDH calculation is one of the methods specified.

Simplified Total Dynamic Head (TDH) Calculation Worksheet

Determine Maximum System Flow Rate:

Minimum Flow Rate Required: 35 gpm Per Skimmer

1. Calculate Pool Volume: $\frac{\text{_____}}{\text{(Surf. Area)}} \times \frac{\text{_____}}{\text{(Avg. Depth)}} \times 7.48 \text{ (gal./cubic foot)} = \frac{\text{_____}}{\text{(Vol. in gal.)}}$
2. Determine preferred Turnover Time in hours: $\frac{\text{_____}}{\text{(Hours)}} \times 60 \text{ (min. / hr.)} = \frac{\text{_____}}{\text{(Turnover in Min.)}}$
3. Determine Max Flow Rate: $\frac{\text{_____}}{\text{(Vol. in gal.)}} \div \frac{\text{_____}}{\text{(Turnover Mins.)}} = \frac{\text{_____}}{\text{(Pool Flow Rate)}} + \frac{\text{_____}}{\text{(Feature Flow Rate)}} = \frac{\text{_____}}{\text{(System Flow Rate)}}$
4. Spa Jets: $\frac{\text{_____}}{\text{(No. of Jets)}} \times \frac{\text{_____}}{\text{(Jet Flow)}} \text{ gpm per jet} = \frac{\text{_____}}{\text{(Total Jet Flow Rate)}} \text{ flow rate.}$

(For single pump pool/spa combo, use the higher of No. 3 or No. 4 in the following calculations for the pool & spa)

Determine Pipe Sizes:

Branch Piping to be _____ inch to keep velocity Ⓣ 6 fps max. at _____ gpm Maximum System Flow Rate.

Trunk Piping to be _____ inch to keep velocity Ⓣ 8 fps max. at _____ gpm Maximum System Flow Rate.

Return Piping to be _____ inch to keep velocity Ⓣ 10 fps max. at _____ gpm Maximum System Flow Rate.

Determine Simplified TDH:

1. Distance from pool to pump in feet: _____
2. Friction loss (in suction pipe) in _____ inch pipe per 1 ft. Ⓣ _____ gpm = _____ (from pipe flow/friction loss chart)
3. Friction loss (in return pipe) in _____ inch pipe per 1 ft. Ⓣ _____ gpm = _____ (from pipe flow/friction loss chart)
4. $\frac{\text{_____}}{\text{(Length of Suct. Pipe)}} \times \frac{\text{_____}}{\text{(Ft of head/1 ft of Pipe)}} = \frac{\text{_____}}{\text{(TDH Suct. Pipe)}}$
5. $\frac{\text{_____}}{\text{(Length of Return Pipe)}} \times \frac{\text{_____}}{\text{(Ft of head/1 ft of Pipe)}} = \frac{\text{_____}}{\text{(TDH Return Pipe)}}$

TDH in Piping: _____

Filter loss in TDH (from filter data sheet): _____

Heater loss in TDH (from heater data sheet): _____

Total all other loss: _____

Total Simplified TDH: _____

Selected Pump and Main Drain Cover:

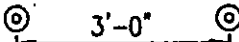

Pump selection _____ using pump curve for Simplified TDH & System Flow Rate
(Pump model and size in Horsepower)

Main Drain Cover _____ (System Flow Rate must not exceed approved cover flow rate)
(Make and Model)

Notes: Minimum system flow based on min. flow per skimmer of 35 gpm.

Determine the Number and Type of Required In-Floor Suction Outlets:

Check all that apply.

- 
- 
- _____
- _____

2 _____ suction outlets Ⓣ _____ gpm max. flow (see note 2).

3 _____ suction outlets Ⓣ _____ gpm max. flow (see note 3).

Aquastar Channel Drain Ⓣ 316 gpm max. flow rate.

A & A Channel Drain Ⓣ 217 gpm w/ 2 port & 278 gpm w/ 3 ports (see note 4).

TDH Calculation Options

For each pump

- Check one.
- Simplified Total Dynamic Head (STDH)**
Complete STDH Worksheet - Fill in all blanks.
- Total Dynamic Head (TDH)**
Complete Program or other calcs. Fill in required blanks on worksheet & attach calculations.

Notes

1. If a variable speed pump is used, use the max. pump flow in calculations.
2. For side wall drains, use appropriate side wall drain flow as published by manufacturer.
3. Insert manufacturer's name and approved maximum flow
4. See installation instructions for number of ports to be used.
5. In-Floor suction outlet cover/grate must conform to most recent edition of ASME/ANSI A112.19.8 and be embossed with that edition approval.
6. Pump & Filter make, model and location can not change without submitting a revised plans and TDH worksheet.

Total Head In Feet Conversion Chart

Inches Mercury (Vacuum Gauge)

	0	2	4	6	8	10	12	14	16	18
0	0.0	2.3	4.5	6.8	9.0	11.3	13.6	15.8	18.1	20.3
1	2.3	4.6	6.8	9.1	11.4	13.6	15.9	18.1	20.4	22.7
2	4.6	6.9	9.1	11.4	13.7	15.9	18.2	20.4	22.7	25.0
3	6.9	9.2	11.5	13.7	16.0	18.2	20.5	22.8	25.0	27.3
4	9.2	11.5	13.8	16.0	18.3	20.5	22.8	25.1	27.3	29.6
5	11.5	13.8	16.1	18.3	20.6	22.8	25.1	27.4	29.6	31.9
6	13.9	16.1	18.4	20.6	22.9	25.2	27.4	29.7	31.9	34.2
7	16.2	18.4	20.7	23.0	25.2	27.5	29.7	32.0	34.3	36.5
8	18.5	20.7	23.0	25.3	27.5	29.8	32.0	34.3	36.6	38.8
9	20.8	23.1	25.3	27.6	29.8	32.1	34.3	36.6	38.9	41.1
10	23.1	25.4	27.6	29.9	32.1	34.4	36.7	38.9	41.2	43.4
11	25.4	27.7	29.9	32.2	34.5	36.7	39.0	41.2	43.5	45.8
12	27.7	30.0	32.2	34.5	36.8	39.0	41.3	43.5	45.8	48.1
13	30.0	32.3	34.6	36.8	39.1	41.3	43.6	45.9	48.1	50.4
14	32.3	34.6	36.9	39.1	41.4	43.6	45.9	48.2	50.4	52.7
15	34.6	36.9	39.2	41.4	43.7	45.9	48.2	50.5	52.7	55.0
16	37.0	39.2	41.5	43.7	46.0	48.3	50.5	52.8	55.0	57.3
17	39.3	41.5	43.8	46.1	48.3	50.6	52.8	55.1	57.4	59.6
18	41.6	43.8	46.1	48.4	50.6	52.9	55.1	57.4	59.7	61.9
19	43.9	46.2	48.4	50.7	52.9	55.2	57.4	59.7	62.0	64.2
20	46.2	48.5	50.7	53.0	55.2	57.5	59.8	62.0	64.3	66.5
21	48.5	50.8	53.0	55.3	57.6	59.8	62.1	64.3	66.6	68.9
22	50.8	53.1	55.3	57.6	59.9	62.1	64.4	66.6	68.9	71.2
23	53.1	55.4	57.7	59.9	62.2	64.4	66.7	69.0	71.2	73.5
24	55.4	57.7	60.0	62.2	64.5	66.7	69.0	71.3	73.5	75.8
25	57.8	60.0	62.3	64.5	66.8	69.1	71.3	73.6	75.8	78.1
26	60.1	62.3	64.6	66.8	69.1	71.4	73.6	75.9	78.1	80.4
27	62.4	64.6	66.9	69.2	71.4	73.7	75.9	78.2	80.5	82.7
28	64.7	66.9	69.2	71.5	73.7	76.0	78.2	80.5	82.8	85.0
29	67.0	69.3	71.5	73.8	76.0	78.3	80.5	82.8	85.1	87.3
30	69.3	71.6	73.8	76.1	78.3	80.6	82.9	85.1	87.4	89.6
31	71.6	73.9	76.1	78.4	80.7	82.9	85.2	87.4	89.7	92.0
32	73.9	76.2	78.4	80.7	83.0	85.2	87.5	89.7	92.0	94.3
33	76.2	78.5	80.7	83.0	85.3	87.5	89.8	92.0	94.3	96.6
34	78.5	80.8	83.1	85.3	87.6	89.8	92.1	94.4	96.6	98.9
35	80.8	83.1	85.4	87.6	89.9	92.2	94.4	96.7	98.9	101.2

Flow and Friction Loss Per Foot

Schedule 40 PVC Pipe

Pipe Size	Velocity - Feet Per Second					
	6 fps		8 fps		10 fps	
1"	16 gpm	0.14'	21 gpm	0.23'	26 gpm	0.35'
1.5"	37 gpm	0.08'	50 gpm	0.14'	62 gpm	0.21'
2"	62 gpm	0.06'	82 gpm	0.10'	103 gpm	0.16'
2.5"	88 gpm	0.05'	117 gpm	0.09'	146 gpm	0.13'
3"	138 gpm	0.04'	181 gpm	0.07'	227 gpm	0.10'
4"	234 gpm	0.03'	313 gpm	0.05'	392 gpm	0.07'
6"	534 gpm	0.02'	712 gpm	0.03'		

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