

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

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

- Distance from pool to pump in feet: \_\_\_\_\_
- Friction loss (in suction pipe) in \_\_\_\_\_ inch pipe per 1 ft. @ \_\_\_\_\_ gpm = \_\_\_\_\_ (from pipe flow/friction loss chart)
- Friction loss (in return pipe) in \_\_\_\_\_ inch pipe per 1 ft. @ \_\_\_\_\_ gpm = \_\_\_\_\_ (from pipe flow/friction loss chart)
- $\frac{\text{Length of Suct. Pipe}}{(\text{FI of head/1 ft of Pipe})} = \frac{\text{TDH Suct. Pipe}}{(\text{TDH Return Pipe})}$
- $\frac{\text{Length of Return Pipe}}{(\text{FI of head/1 ft of Pipe})} = \frac{\text{TDH Return Pipe}}{(\text{TDH Suct. Pipe})}$

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: \_\_\_\_\_

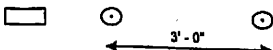

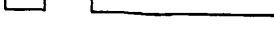
#### Selected Pump and Main Drain Cover:

Pump selection \_\_\_\_\_ using pump curve for Simplified TDH & System Flow Rate

Main Drain Cover \_\_\_\_\_ (System Flow Rate must not exceed approved cover flow rate)

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

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

-  Dual Main Drains  suction outlets @ \_\_\_\_\_ gpm max. flow
-  Multi Main Drains  suction outlets @ \_\_\_\_\_ gpm max. flow
-  Channel Drain  channel drain @ \_\_\_\_\_ gpm w/ \_\_\_\_\_ ports

#### 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 c.a.s. Fill in required blanks on worksheet & attach calculations.
- Maximum Flow Capacity  
of the new or replacement pump.

#### Notes ..

- If a variable speed pump is used, use the max. pump flow in calculations.
- For side wall drains, use appropriate side wall drain flow as published by manufacturer.
- 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.
- Pump & Filter make, model and location can not change without submitting a revised plans and TDH worksheet.

#### Flow and Friction Loss Per Foot Schedule 40 PVC Pipe

Pipe Size	Velocity - Feet Per Second					
	8 fps		8 fps		10 fps	
1"	18 gpm	0.14'	21 gpm	0.23'	28 gpm	0.35'
1.5"	37 gpm	0.08'	50 gpm	0.14'	62 gpm	0.21'
2"	62 gpm	0.08'	82 gpm	0.10'	103 gpm	0.16'
2.5"	88 gpm	0.05'	117 gpm	0.09'	148 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'		

#### 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	4.5	6.8	9.0	11.3	13.6	15.8	18.1	20.4	22.7
2	4.5	6.8	9.0	11.3	13.7	15.9	18.2	20.4	22.7	25.0
3	6.8	9.0	11.3	13.7	16.0	18.2	20.5	22.8	25.0	27.3
4	9.0	11.3	13.6	16.0	18.3	20.5	22.8	25.1	27.4	29.6
5	11.3	13.6	16.0	18.3	20.6	22.8	25.1	27.4	29.7	31.9
6	13.6	16.0	18.3	20.6	22.9	25.2	27.4	29.7	31.9	34.2
7	16.0	18.3	20.6	22.9	25.2	27.5	29.7	32.0	34.3	36.5
8	18.3	20.7	23.0	25.3	27.5	29.8	32.0	34.3	36.6	38.8
9	20.7	23.0	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	34.5	36.8	39.1	41.3	43.6	45.9	48.1	50.4
14	32.3	34.6	36.8	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	52.8	55.0
16	37.0	39.2	41.5	43.7	46.0	48.3	50.5	52.8	55.1	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	46.1	48.4	50.7	52.9	55.2	57.4	59.7	62.0	64.2
20	46.2	48.4	50.7	52.9	55.2	57.5	59.8	62.1	64.3	66.5
21	48.5	50.8	53.0	55.3	57.6	59.8	62.1	64.4	66.6	68.8
22	50.8	53.1	55.3	57.6	59.9	62.1	64.4	66.7	69.0	71.2
23	53.1	55.4	57.7	59.9	62.2	64.4	66.7	69.0	71.3	73.5
24	55.4	57.7	60.0	62.2	64.5	66.7	69.0	71.3	73.5	75.8
25	57.7	60.0	62.3	64.5	66.8	69.1	71.3	73.6	75.8	78.1
26	60.1	62.3	64.5	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	80.9	83.1	85.4	87.6	89.9	92.2	94.4	96.7	98.9	101.2

NOTE: FIELD TDH MUST BE EQUAL TO OR HIGHER THAN THE CALCULATED TDH.

Job Address: \_\_\_\_\_

Company Name: \_\_\_\_\_

License Number: \_\_\_\_\_

Signature of License Holder \_\_\_\_\_