ANSI/APSP 5&7, 2013 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: 35gpm per skimmer (required: 1 skimmer per 800 sq ft of surf. area)

1. Calculate Pool Volume _____ (Surface Area) X _____ (Avg Depth) X 7.48 (gal./cubic foot) = _____ (Volume in Gallons)
2. Determine preferred Turnover Time in Hours: _____ (Hours) X 60 (min / hour) = _____ (Turnover in min)
3. Determine Max Flow Rate _____ (Volume in Gallons) / _____ (Turnover in Min) + _____ (Pool Flow Rate) = _____ (System Flow Rate)
4. Spa Jets: _____ (No of Jets) X _____ (Jet Flow) GPM per jet = _____ (Total Jet Flow Rate) 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

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

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

Determine Simplified TDH:

1. Distance from pool, to pump in Ft: _____
2. Friction loss (in suction pipe) in _____ inch pipe per 1 t. @ gpm = _____ (from pipe flow/friction loss chart)
3. Friction loss (in return pipe) in _____ inch pipe per 1 t. @ gpm = _____ (from pipe flow/friction loss chart)
4. _____ (Length of Suction Pipe) X _____ (Ft of head/1 ft of Pipe) = _____ (TDH Suction Pipe)
5. _____ (Length of Return Pipe) X _____ (Ft of head/1 ft of Pipe) = _____ (TDH Suction Pipe)

Flow and Friction Loss Per Foot
(Schedule 40 pvc Pipe)

Velocity - Feet Per Second					
Pipe Size	6 FPS		8 FPS		
1.5"	37 gpm	0.08'	50 gpm	.14'	
2"	62gpm	0.06'	82 gpm	.10"	
2.5"	88 gpm	0.05'	117 gpm	.08'	
3"	136 gpm	0.04'	181 gpm	.07'	

TDH in Piping _____
Filter loss in TDH (from filter data sheet) _____
Heater loss in TDH (from heater data sheet) _____
Total all other loss _____
Total Dynamic Head (TDH) _____

Selected Pump and Main Drain Cover:

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

Main Drain Cover _____ (model) (System Flow Rate must not exceed approved cover flow rates)

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

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

(Check all that apply)

☐ ⊙ ← 3' → ⊙ _____ suction outlets @ _____ gpm max. flow (see note 2)

☐ ⊙ ⊙ ⊙ _____ suction outlets @ _____ gpm max. flow (see note 3)

☐ [ ] _____ channel drain @ _____ gpm w/ _____ 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

☐ Maximum Flow Capacity
of the new or replacement pump

Notes:

1. If a variable speed pump is used, use the max pump low 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 and Heater make and model cannot change, and equipment location cannot be move closer the pool without submitting a revised plan and TDH calculation worksheet for approval

Velocity - Feet Per Second					
Pipe Size	6 FPS		8 FPS		
1.5"	37 gpm	0.08'	50 gpm	.14'	
2"	62 gpm	0.06'	82 gpm	.10"	
2.5"	88 gpm	0.05'	117 gpm	.08'	
3"	136 gpm	0.04'	181 gpm	.07'	
4"	234 gpm	0.03'	313 gpm	.05'	
6"	534 gpm	0.02'	712 gpm	.03'	

ANSI/APSP/ICC Worksheet

Swimming Pool Energy Efficiency Compliance Information

Note: These Requirements Apply ONLY to the **Filtration Pump**

Maximum Filtration Flow Rate Calcutlations

Pool Water Voume_____ ÷ 360 = _____ gpm = filtration flow rate

Is there an Auxiliary load on the filtration pump? Yes_○_ NO_○_

If so, what is the auxiliary flow rate _____gpm

Maximum Flow Rate _____gpm (maximum auxiliary pool loads or the filtration flow rate, whichever is greater.

The pool filtration flow rate shall not be greater than the rate needed to turn over the pool water volume in 6 hours or 36 gpm whichever is greater. This means that for pools of less than 13000 gallons, the pump shall be sized to have a flow rate of 36 gpm or less.

Suction Pipe size @ 8 fps _____inch

Return Pipe size @ 8 fps _____inch

Filter Factors: (Cartridge .375) or (D.E 2) or (Sand 15)

_____ ÷ _____ = _____

(flow rate) (filter factor) (minimum filter size)

Filter Make/Size _____

Backwash valve? Yes_○_ No_○_ (if yes, must be 2 inch min)

Pump Selection from APSP database on Curve **A (less than 17000 gallons)** or **C (greater than 17000 gallons)** (circle one)

Model _____

Flow Rate (low speed)_____gpm @ _____rpm

Flow Rate (high speed) _____gpm @ _____ rpm

Pump Controls

Standard time clock / 2 speed time clock _____or other _____

Heater Model _____

Notes: suction piping in front of pump inlet must be 4 pipe diameters in length. Must have 18" of straight pipe after the filter for solar.

_____

Date

_____

Contractors Signature

_____

Print Name

_____

Certification Number

_____

Telephone Number

Swimming Pool Specifications for:

Owner: _____

Address _____

City, State, Zip _____

Total Head In Feet Conversion Chart

Inches Mercury (Vacuum Gauge)

PSI	0	2	4	6	8	10	12	14	16	18
0	0	2.3	4.5	6.8	9	11.3	13.6	15.8	18.1	20.3
1	2.3	4.6	5.8	9.1	11.4	13.6	15.9	18.1	20.4	22.7
2	4.6	6.9	6.1	11.4	13.7	15.9	18.2	20.4	22.7	25
3	6.9	9.2	11.5	13.7	16	18.2	20.5	22.8	25	27.3
4	9.2	11.5	13.8	16	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	25.2	27.5	29.7	82	34.3	36.5
8	18.5	20.7	23	25.3	27.5	29.8	32	34.4	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	41.2	43.5	45.8
12	27.7	30	32.2	34.5	36.8	39	41.3	43.5	45.8	48.1
13	30	32.3	34.5	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
16	37	39.2	41.5	43.7	46	48.3	50.5	52.8	55	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	64.2
20	46.2	48.5	50.7	53	55.2	57.5	59.8	62	64.3	66.5
21	48.5	50.8	53	55.3	57.6	59.8	62.1	64.3	66.6	58.9
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	71.2	73.5
24	55.4	57.7	60	62.5	64.5	66.7	69	71.3	73.5	75.8
25	57.8	60	62.3	64.5	66.8	69.1	71.3	73.6	75.8	78
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	90.5	82.7
28	64.7	66.9	69.2	71.5	73.7	76	78.2	80.5	82.8	85
29	67	69.3	71.5	73.8	76	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
32	73.9	76.2	78.4	80.7	83.1	85.2	87.5	89.7	92	94.3
33	76.2	78.5	80.7	83	85.3	87.5	89.8	92	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.

** GAGES TO BE INSTALLED AT THE TIME OF FINAL INSPECTION FOR VERIFICATION.