

# Simplified Total Dynamic Head (TDH) Calculation Worksheet

CALCULATIONS MUST BE PER ANSI/APSP/ICC 7-13 & FBC-R R4501.6

The Contractor is responsible the accuracy of the 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 \_\_\_\_\_ X \_\_\_\_\_ X 7.48 (gal./cubic foot) = \_\_\_\_\_  
(Surface Area) (Avg Depth) (Volume in Gallons)
2. Determine preferred Turnover Time in Hours: \_\_\_\_\_ X 60 (min / hour) = \_\_\_\_\_  
(Hours) (Turnover in min)
3. Determine Max Flow Rate \_\_\_\_\_ / \_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_  
(Volume in Gallons) (Turnover in Min) (Pool Flow Rate) (System Flow Rate)
4. Spa Jets: \_\_\_\_\_ X \_\_\_\_\_ GPM per jet = \_\_\_\_\_ flow rate  
(No of Jets) (Jet Flow) (Total Jet 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 @ 10 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. \_\_\_\_\_ X \_\_\_\_\_ = \_\_\_\_\_  
(Length of Suction Pipe) (Ft of head/1 ft of Pipe) (TDH Suction Pipe)
5. \_\_\_\_\_ X \_\_\_\_\_ = \_\_\_\_\_  
(Length of Suction Pipe) (Ft of head/1 ft of Pipe) (TDH Suction Pipe)

## Flow and Friction Loss Per Foot

(Schedule 40 pvc Pipe)

Pipe Size	Velocity - Feet Per Second					
	6 FPS		8 FPS		10 FPS	
1.5"	37 gpm	0.08'	50 gpm	.14'	62 gpm	.21'
2"	62 gpm	0.06'	82 gpm	.10"	103 gpm	.16'
2.5"	88 gpm	0.05'	117 gpm	.08'	148 gpm	.13'
3"	136 gpm	0.04'	181 gpm	.07'	227 gpm	.10'

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

Main Drain Cover \_\_\_\_\_ (System Flow Rate must not exceed approved cover flow rates)  
(Pump model and size in HP)

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		10 FPS	
1.5"	37 gpm	0.08'	50 gpm	.14'	62 gpm	.21'
2"	62 gpm	0.06'	82 gpm	.10"	103 gpm	.16'
2.5"	88 gpm	0.05'	117 gpm	.08'	148 gpm	.13'
3"	136 gpm	0.04'	181 gpm	.07'	227 gpm	.10'
4"	234 gpm	0.03'	313 gpm	.05'	392 gpm	.07'
6"	534 gpm	0.02'	712 gpm	.03'		

\_\_\_\_\_

Date

\_\_\_\_\_

Contractors Signature

\_\_\_\_\_

Print Name

\_\_\_\_\_

Certification Number

\_\_\_\_\_

Telephone Number

**ANSI/APSP/ICC Worksheet**

Swimming Pool Energy Efficiency Compliance Information

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

**Maximum Filtration Flow Rate Calculatlations**

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 @ 6 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 (not required

if no auxiliary load on filtration pump

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.

**Swimming Pool Specifications for:**

Owner: \_\_\_\_\_

Address \_\_\_\_\_

City, State, Zip \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## Total Head In Feet Conversion Chart

Inches Mercury (Vacuum Gauge)

	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	32	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	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	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	80.5	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

P  
S  
I

\* 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.