



SWIMMING POOL HYDRAULIC ANALYSIS WORKSHEET

POOL NAME _____ DATE _____

POOL ADDRESS _____

Shape _____ Perimeter ft. _____ Width _____
Length _____ Min. Depth _____ Break _____ Max. _____
Depth _____ Depth _____
Slope = 1 ft. in _____ ft. Area = _____ Sq. ft. Volume = _____ gallons

Gunite _____ Poured _____ Other _____ Pipe Mat'l _____
Outdoor or Indoor _____

Design Flow Rate = Pool Volume () Gal. = _____ gpm
Turnover time *1 () Min.

Check minimum skimmer flow rate. If turnover rate is inadequate for minimum skimmer operation (as per manufacturer or 25 gpm) then design flow rate must be increased to provide minimum skimmer flow rate.

I. Number of Skimmers Required:

_____ Quantity = no. of skimmers required from Swimming Pool Rules.

Surface Area of Pool _____ sq. ft. No. of skimmers required _____
No. of skimmers provided _____

II. Skimmer Flow Rate:

_____ A.) If wall returns are utilized:
Skimmer flow rate = Design flow rate x 0.8
= _____ gpm. x 0.8 = _____ gpm
B.) If floor returns are utilized:
Skimmer flow rate = Design flow rate = _____ gpm

Flow through each Skimmer:

_____ Skimmer flow skimmer flow rate (above) = (_____ gpm) = _____ gpm
for each skimmer no. of skimmers provided (_____) *2

III. Number of Inlets Required: (15' max. spacing)

No. of inlets = perimeter = (_____) = _____ (Use next
15' (15') whole number)

*1 For pool use minimum 6 hr. turnover (360 min.)

For other pools, use table in Rule .07

*2 Must be at least 25 gpm.

IV. Pipe Size Selection

A. Skimmer Line Size:

Select pipe size which give max. 4' – 6' fps velocity at skimmer flow rate.

No. Skimmers Served by Pipe	Branch 1 _____	Branch 2 _____	Branch 3 _____	Branch 4 _____
Pipe Size	_____	_____	_____	_____
Flow in Pipe	_____	_____	_____	_____
Velocity (fps)	_____	_____	_____	_____
(Indicate which chart used for velocity numbers) _____				

B. Return Line Size:

Select pipe size and branches, which give max. 5 - 10 fps velocity at design flow rate.

No. inlets served by pipe	Branch 1 _____	Branch 2 _____	Branch 3 _____	Branch 4 _____
Pipe Size	_____	_____	_____	_____
Flow in pipe	_____	_____	_____	_____
Velocity (fps)	_____	_____	_____	_____
(Indicate which chart used for velocity numbers) _____				

C. Main Drain Size:

Select pipe size which gives max. 6 fps velocity at design flow rate.

Pipe size _____ Design flow rate _____ Velocity (fps) _____

V. Main Drain Grate Selection

Main drain outlet: (4 to 1 open area ratio each drain)
 (2 required) (1 ½ fps max. velocity through grate-each drain) *1

Pipe Size	Grate Size (each)	Flow Area (each)	Velocity (fps.)	(Total Flow,) (Both Drains)
_____	_____	_____	_____	_____

Frame & Grate Cat. No. _____ Quan. _____

*1 If therapy flow is through these grates, this flow must also be figured into all calculations.

MAIN DRAIN LINE LOSS: *

If wall returns are utilized: Head loss calculation must be based on:

Main drain flow rate = 0.2 x design flow rate

= 0.2 x _____ gpm

= _____ gpm

Straight Pipe Length (Size _____) = _____

_____ elbows x equiv. length _____ = _____

_____ tees x equiv. length _____ = _____

_____ valves x equiv. length _____ = _____

Total equiv. length = _____

Friction loss per 100' _____ x total equiv. length _____ ÷ 100 = _____
*1 * (enter on page 6)

If floor returns are utilized: Head loss calculations are based on 100% flow thru skimmers.

Skimmer flow rate = design flow rate

Main drain flow rate = 0

Main drain head loss = 0 (enter 0 on page 6)

*1 = based on above main drain flow rate

CALCULATE RETURN LINE LOSS:*

STATE WHICH CHART, GRAPH, NOMIGRAPH, ETC. USED _____ ADD _____ AT
BOTTOM OF COLUMN

1. Straight pipe size _____ = _____ @ _____ gpm
 # _____ Elbows x Equiv. Length _____ = _____
 # _____ Tees x Equiv. Length _____ = _____
 # _____ Valves x Equiv. Length _____ = _____
 Friction loss per 100' _____ x total equiv. length _____ ÷ 100 = _____ ft.
 (for above pipe size)

2. Straight pipe size _____ = _____ @ _____ gpm
 # _____ Elbows x Equiv. Length _____ = _____
 # _____ Tees x Equiv. Length _____ = _____
 # _____ Valves x Equiv. Length _____ = _____
 Friction loss per 100' _____ x total equiv. length _____ ÷ 100 = _____ ft.
 (for above pipe size)

3. Straight pipe size _____ = _____ @ _____ gpm
 # _____ Elbows x Equiv. Length _____ = _____
 # _____ Tees x Equiv. Length _____ = _____
 # _____ Valves x Equiv. Length _____ = _____
 Friction loss per 100' _____ x total equiv. length _____ ÷ 100 = _____ ft.
 (for above pipe size)

4. Straight pipe size _____ = _____ @ _____ gpm
 # _____ Elbows x Equiv. Length _____ = _____
 # _____ Tees x Equiv. Length _____ = _____
 # _____ Valves x Equiv. Length _____ = _____
 Friction loss per 100' _____ x total equiv. length _____ ÷ 100 = _____ ft.
 (for above pipe size)

5. Straight pipe size _____ = _____ @ _____ gpm
 # _____ Elbows x Equiv. Length _____ = _____
 # _____ Tees x Equiv. Length _____ = _____
 # _____ Valves x Equiv. Length _____ = _____
 Friction loss per 100' _____ x total equiv. length _____ ÷ 100 = _____ ft.
 (for above pipe size)

6. Straight pipe size _____ = _____ @ _____ gpm
 # _____ Elbows x Equiv. Length _____ = _____
 # _____ Tees x Equiv. Length _____ = _____
 # _____ Valves x Equiv. Length _____ = _____
 Friction loss per 100' _____ x total equiv. length _____ ÷ 100 = _____ ft.
 (for above pipe size)

Friction loss due to inlet resistance at _____ gpm = _____ ft.
 (from manufacturer)

Total Return Line friction loss = _____ ft.
 (add all _____ totals) *(Enter on page 6)

CALCULATE SKIMMER LINE LOSS: *

STATE WHICH CHART, GRAPH, NOMIGRAPH, ETC. USED _____ ADD _____ AT
BOTTOM OF COLUMN

1. Straight pipe size _____ = _____ @ _____ gpm
 # _____ Elbows x Equiv. Length _____ = _____
 # _____ Tees x Equiv. Length _____ = _____
 # _____ Valves x Equiv. Length _____ = _____
 Friction loss per 100' _____ x total equiv. length _____ ÷ 100 = _____ ft.

2. Straight pipe size _____ = _____ @ _____ gpm
 # _____ Elbows x Equiv. Length _____ = _____
 # _____ Tees x Equiv. Length _____ = _____
 # _____ Valves x Equiv. Length _____ = _____
 Friction loss per 100' _____ x total equiv. length _____ ÷ 100 = _____ ft.
 (for above pipe size)

3. Straight pipe size _____ = _____ @ _____ gpm
 # _____ Elbows x Equiv. Length _____ = _____
 # _____ Tees x Equiv. Length _____ = _____
 # _____ Valves x Equiv. Length _____ = _____
 Friction loss per 100' _____ x total equiv. length _____ ÷ 100 = _____ ft.
 (for above pipe size)

4. Straight pipe size _____ = _____ @ _____ gpm
 # _____ Elbows x Equiv. Length _____ = _____
 # _____ Tees x Equiv. Length _____ = _____
 # _____ Valves x Equiv. Length _____ = _____
 Friction loss per 100' _____ x total equiv. length _____ ÷ 100 = _____ ft.
 (for above pipe size)

5. Straight pipe size _____ = _____ @ _____ gpm
 # _____ Elbows x Equiv. Length _____ = _____
 # _____ Tees x Equiv. Length _____ = _____
 # _____ Valves x Equiv. Length _____ = _____
 Friction loss per 100' _____ x total equiv. length _____ ÷ 100 = _____ ft.
 (for above pipe size)

6. Straight pipe size _____ = _____ @ _____ gpm
 # _____ Elbows x Equiv. Length _____ = _____
 # _____ Tees x Equiv. Length _____ = _____
 # _____ Valves x Equiv. Length _____ = _____
 Friction loss per 100' _____ x total equiv. length _____ ÷ 100 = _____ ft.
 (for above pipe size)

Friction loss over the weir at _____ gpm = _____ ft.
 (from manufacturer)

Total Skimmer Line friction loss = _____ ft.
 (add all _____ totals) *(Enter on page 6)

Total Dynamic Head Required:

Main Drain Line Loss = _____ ft.
 (from page 3)

Return Line Loss = _____ ft.
 (from page 4)

Filter Loss When Dirty = _____ ft.
 *(see below)

Skimmer Line Loss = _____ ft.
 (from page 5)

Heater Loss = _____ ft.
 (from manufacturer)

Other (Multiport valves, etc.) = _____ ft.
 (from manufacturer)

Total Loss _____ ft.

Pump Selection: (Submit Curve)

Make _____ Model _____, _____ gpm @ _____ TDH

Backwash rate _____ gpm @ _____ TDH**

Filter Selection:

Filter area required = $\left(\frac{\text{Design flow rate}}{\text{Flow Rate per sq. ft.}} \right) = \left(\frac{\quad}{\quad} \right) = \quad$

Flow rate per sq. ft. = (Diatomite = 1 gpm per sq. ft.) (Hi rate = 15 gpm per sq. ft.)
 (Sand = 5 gpm per sq. ft.) (Cartridge = .3 gpm per sq. ft.)

Cat. No. _____ Model _____

Filter Area _____ sq. ft. No. Tanks _____ Size _____

Pump Specifications _____ HP _____ Cycle _____ Phase _____ Volt _____ RPM

Certified Contractor _____ Certification Number _____

Representing _____

Approved & Checked By _____ Date _____
 (Health Dept.)

* Cartridge Filter = 23.1 ft.
 Sand Filter = 34.7 ft.
 Pressure D.E. = 57.8 ft.
 Vacuum D.E. = 4.3 ft.

** Backwash TDH = TDH - Return Piping and Fixtures + Backwash Line Loss