POOL COMPONENTS
Why Should I Know the Volume of My Pool?

- Essential calculation to maintain proper management of each water recreation facility

- Needed to calculate flow rate and turnover rate

- Determining the chemical correction requirements for your pool
Pool Volume Calculation

- Rectangular Pool
  - Volume (gallons) = L x W x Average Depth(H) x 7.5 gal/cu.ft.

- Steps:
  i. Calculate the surface area (L x W)
  ii. Average depth (ft.) = D1 + D2 ÷ 2
  iii. One cubic foot (L x W x H) holds 7.5 gallons of water
Calculating Volume Where Slope Changes

Volume = L x W x D_{Avg} x 7.5

Take each section separately, then add sections together.

A = 30’ x 20’ x 4’ x 7.5 =
B = 10’ x 20’ x 7’ x 7.5 =
C = 10’ x 20’ x 8’ x 7.5 =
Pool Volume Example

Total volume is 40,500 gallons

Section A 18,000
Section B 10,500
Section C 12,000
Turnover Rate (TOR) Requirement

- Means the minimum time necessary to circulate the entire volume of the pool water through the treatment system.
- Equipment shall be of adequate size to turnover the entire pool capacity.

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<th>Pool Type</th>
<th>WAC Requirements</th>
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<td>Swimming Pool</td>
<td>6 hours or less</td>
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<tr>
<td>Wading Pool</td>
<td>3 hours or less</td>
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<tr>
<td>Spa</td>
<td>*30 minutes or less</td>
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<tr>
<td>Recirculated Spray Pool</td>
<td>30 minutes or less</td>
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Assess Turnover Rate (TOR)

1. Determine the pool volume in gallons from the plans or records
2. Determine the required turnover rate based on pool type
3. Check flow meter installation/characteristics
4. Record the flow meter reading (gpm) during the inspection
5. Calculate the turnover rate using the formula below:

\[
\text{Pool volume} \div \text{flow rate (gpm)} \div 60 \text{ min/hr.} = \text{TOR}
\]
Turnover Rate Example

Formula: Pool volume ÷ flow rate ÷ 60 min/hr. = TOR

- A 175,000-gallons pool has a flow meter reading of 505 gpm.
- What is the TOR (in hours) for this pool?
- Does the pool meet the required TOR?

\[
\text{TOR} = \frac{175,000 \text{ gal}}{505 \text{ gpm}} = 346.5 \text{ minutes} \div 60 \text{ min./hr.} = 5.77 \text{ hrs.}
\]
Turnover Rate Example

Formula: Pool volume ÷ flow rate ÷ 60 min/hr. = TOR

- A 16,500 gallons pool has a flow meter reading of 180 gpm.
- What is the turnover rate (in hours) for this wading pool?
- Does the wading pool meet the required TOR?

\[
\text{TOR} = \frac{16,500 \text{ gal}}{180 \text{ gpm}} = 91.6 \text{ mins or } 1.53 \text{ hours}
\]
Flow rate

- What does flow rate mean?
- How is flow rate determined?
How to read my flow meter?

Sharp Edge Float

Read Float at Largest Diameter

Ball Float

UP
Calculating flow rate

Example 1
You have a swimming pool volume of 300,000 gallons with a TOR of 6 hours.
What is the flow rate?

Answer: 833.33 gpm

Example 2
You have a spa volume of 950 gallons with a TOR of 30 minutes.
What is the flow rate?

Answer: 32 gpm

Flow rate (gpm) = Pool Volume ÷ Turnover Rate in hours ÷ 60 min/hr
Importance of Recirculation

- Allows you to filter your water and remove large and small particles.

- Helps spread chemicals throughout the pool for proper water quality.

- Proper recirculation can help kill and prevent the spread of Recreational Water Illnesses.
Determine Pool Volume and Flow Rate

- **Given**
  - $L = 50$ feet
  - $W = 30$ feet
  - Average Depth = 4 feet
  - Turnover Rate Required = 6 hrs.

- **Formulas**
  - Volume = $L \times W \times \text{Avg Depth} \times 7.5 \text{ gal./cu. ft.}$
  - FR = $\frac{\text{Volume (gal)}}{\text{Turnover Rate (hrs.)}} \div 60$ (min/hr.)
Determine Pool Volume and Flow Rate

Solution

Volume = 50’ x 30’ x 4’ x 7.5 cu.ft./gal = 45,000 gal

Flow Rate = 45,000 gal ÷ 6 hrs. ÷ 60 (min/hour) = 125 gpm
Questions?
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