**Storage Tank Volumes**

**Tank Volume, m³/metre (Rectangular Tanks Only)**

<table>
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<th>Length (m)</th>
<th>Width (m)</th>
<th>3.05</th>
<th>3.66</th>
<th>4.27</th>
<th>4.88</th>
<th>5.49</th>
<th>6.10</th>
<th>7.62</th>
<th>9.15</th>
<th>10.67</th>
<th>12.19</th>
<th>13.72</th>
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<th>16.76</th>
<th>18.29</th>
<th>19.81</th>
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**Tank Volume Formulas:**

Capacity, volume and displacement calculations use simple volumetric relationships for rectangles, cylinders, concentric cylinders and other shapes with the appropriate unit conversion factors.

Tanks on rigs can be a variety of shapes, but most are either rectangular or cylindrical. Three shapes of tanks are covered here:

1. Rectangular
2. Cylindrical, vertical
3. Cylindrical, horizontal

**Rectangular Tank:**

Mud tanks are usually rectangular with parallel sides and ends that are perpendicular to the bottom.

For a typical rectangular tank, the capacity can be calculated from the height, width and length.

**Where:**

\[
\text{Tank Capacity} = V_{tank} \\
\text{Tank Length} = L \\
\text{Tank Width} = W \\
\text{Tank Height} = H
\]

**The general equation to calculate the capacity of a rectangular vessel is:**

\[
\text{Volume} = \text{Length} \times \text{Width} \times \text{Height}
\]

This formula is valid for both English and Metric units.

**Therefore, the capacity of a rectangular pit, using metres, is calculated by:**

\[
V_{tank} (m^3) = L (m) \times W (m) \times H (m)
\]
**Vertical Cylindrical Tank:**

Cylindrical tanks mounted in a vertical position are normally used for liquid mud and/or dry bulk Barite storage.

**Where:**

- \( V_{\text{Cyl}} \) = Capacity of the Cylindrical Tank
- \( D \) = Diameter of Cylinder
- \( H \) = Height of Cylinder
- \( M \) = Material Level Height
- \( \pi \) = 3.1416

*If the diameter is not known, measure the circumference and divide by 3.1416*

\[
D = \frac{\text{Tank Circumference}}{\pi} = \frac{\text{Tank Circumference}}{3.1416}
\]

The general formula to calculate the capacity for a vertical cylinder tank is:

\[
V_{\text{Cyl}} (m^3) = \frac{\pi \times D^2 (m) \times H (m)}{4} = \frac{3.1416 \times D^2 (m) \times H (m)}{4} = \frac{D^2 (m) \times H (m)}{1.273}
\]

The actual mud volume \( (V_{\text{mud}}) \) of a vertical cylinder tank is calculated using the mud/material level height \( (M) \) by:

\[
V_{\text{mud}} (m^3) = \frac{\pi \times D^2 \times M}{4} = \frac{D^2 \times M}{1.273}
\]
Horizontal Cylindrical Tank:

Cylindrical tanks mounted in a horizontal position are normally used primarily for storage of diesel fuel, other liquids and/or Barite. The vertical capacity and volume of a horizontal cylindrical tank varies with the horizontal cross-section area, and is not a linear function of height. Charts and tabular methods are available to calculate the capacity and volume of horizontal cylindrical tanks.

Where:

\[ V_{Cyl} = \text{Capacity of the Cylindrical Tank} \]

\[ D = \text{Diameter of Cylinder} \]

\[ L = \text{Length of Cylinder} \]

\[ M = \text{Mud or Material Height} \]

\[ \pi = 3.1416 \]

\[
V_{Cyl} = \frac{L}{2} \left[ (2M - D) \sqrt{MD - M^2} + \frac{D^2}{2} \sin^{-1}\left(\frac{2M-1}{D}\right) + \frac{\pi D^2}{4} \right]
\]

The result from \( \sin^{-1} \) must be in radians before being added to the other parts of the equation (2\( \pi \) radians = 360°). To convert from degrees, divide by 57.3 (degree/radian) to obtain radians.