Vertical Cylindrical Small Based Reservers Details

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Abstract: This article provides a brief overview of reservoirs. Constructive features of the cylinder reservoir bottom are calculated for wall strength.

Index Terms: Capacity, liquid gases, liquid ammonia, petroleum products, reservoirs for oil, texts and other liquids, water.

1 INTRODUCTION

Cylindrical (vertical and horizontal), spherical, dropsy, hand-shaped, and other shapes may be spatial and geometric. Reservoirs may be located above the ground, half under the surface, under the earth's surface, and under the aquifers, above the ground level. Reservations can be invariable and variable in size. When selecting a reservoir type, it will look at the order of its use, the nature of the liquid to be stored and the climate of the area under construction. Cylindrical vertical and horizontal reservoirs are widely used in construction as the technology of preparation is easier [1,2]. Roofed tanks are called small pressure vessels. They are often used to store oil products. Filling and dismissing occurs 10 to 12 times a year. During filling, the pressure increases. (Up to 2 kPa), during vacuum, a vacuum may be formed and the pressure will be 0.25 kPa. Many times oil reservoirs make the roof condition of the reservoirs flush. Such bottles do not produce excessive pressure and no vacuum. For long-term storage of reservoirs and oil products at high pressure (up to 30 kPa). Spherical reservoirs are used to store large quantities of liquid gases and droplets are used to store large quantities of gasoline.

2 METHODS OF RESEARCH

Vertical cylinder small pressure reservoirs. Vertical cylindrical reservoirs are often used for storage of oil and oil products. They are easy to prepare and recover. Save on steel consumption. If there is enough gas in them, the volume can range from 100 to 20,000 cubic meters. If the oil is stored, it can hold up to 50,000 cubic meters. In the future, the amount of storage can be increased if fire resistance measures are taken. Wall ceilings are the main elements of vertical cylindrical reservoirs. They are made of sheet steel. V.G. Shukhov founded the reservoir [3,4,5,6]. At its recommendation, the size of the elements depends on the size of the reservoir. V.G. Shukhov has an effective size for vertical cylindrical reservoirs. Using these dimensions, steel is the least consumed. Reservoir wall storage tanks are the minimum weight, and if the bottom of the reservoir and the roof joint are greater than the weight of the wall, then the rational height of the reservoir is determined by the following formula [7,8,9,10].

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$$h_{onm} = \sqrt[3]{\frac{v}{\pi}\left(\frac{\sum t_{gn}}{t_w}\right)^2} \qquad (1)$$

where: V - reservoir capacity,

Σt_{gn} - is the sum of the bottom and roof thicknesses.

t_w - wall thickness.

In large reservoirs, wall thickness is variable. In such reservoirs an optimal solution is obtained if the total weight of the roof and bottom is equal to the weight of the wall. In this case

$$h_{onm} = \sqrt{\gamma R^{cb} \sum t_{gn} / \gamma_f \cdot V_{жс}} \qquad (2)$$

γ_f – Reliability coefficient on load.

$V_ж$ –volume weight of liquid.

$$\sum t_{gn} = t_g + t_{кр} \qquad (3)$$

Roll sheet steel is used for making tanks up to 30,000 cubic meters. The height of the stand is 12m, taking into account the size of the stand. If a reasonable height of more than 14m is more than 14m, then the height is 18m. This height is taken into account in sheet steel width (1400, 1500, 2000mm). The diameter of the diameter is obtained in the following range. 10000m3 - (h / D =). Constructive properties of cylindrical reservoir bottom. Since the reservoir bottom relies on the sand layer, it does not produce much voltage from the stored liquid. Therefore, it does not count. Its thickness is obtained constructively. It also takes into account the ease of welding to the bottom of the wall and its resistance to corrosion. The bulk of the base is made of sheet metal of 1400 x 4200 mm and 4mm thick. The reservoir can be up to 15m in diameter and 1000m3 in size. If it is larger, it is made of sheet steel with a diameter of 18m - 25m and a thickness of 5mm and a size of 1500 x 1600 or 2000 x 8000. If the diameter is greater than D-25 m, the bottom is made of sheet steel 6mm thick. Steel sheets of t = 4mm and 5mm bottom are fastened to each other by 30 - 60mm, and t-sheets are made of three or more thicknesses. The bottom of the reservoir is transported to the construction site by transporting and packing it in enterprise environments. But the roll bottom should not exceed 60t.

Bottom sheets are fastened to the wall sheets by rotating the edges.

3 RESULTS

Constructive solutions of cylindrical reservoir wall. The wall of the reservoir is made up of several belts, the width of which is equal to that of sheet steel. The sheets on the belt are attached one to three. Straps can be attached to one another through three-piece and over-the-top sutures. Three or three-stroke combinations are performed only in the enterprise setting. Welding can be carried out in an enterprise or construction site. Reservoir wall mounting can be made easily from the belts in the construction site, making it possible to create a welded joint along the outer horizontal axis if the belts are arranged like a telescope. Vertical sutures, binding sheets and sheets, should be placed at different locations.

***Fig. 1**. Horizontal cylindrical reservoirs*

The method of rolling sheets is common in reservoir construction. This method has the advantages of using simple sheets: labor costs are reduced by 1.5-2 times. The cost of restoring the common reservoir will be reduced by 30%, the recovery time will be reduced by 1.7 and 2 times, and the installation costs will be reduced by 15-20%. In an enterprise setting, automatic welding combinations provide better output and more reliability. As a result, the reservoir itself works more reliably. The vertical strip may be in a single line, so that it is easier to perform joint work. The total wall thickness must not exceed 17 mm.

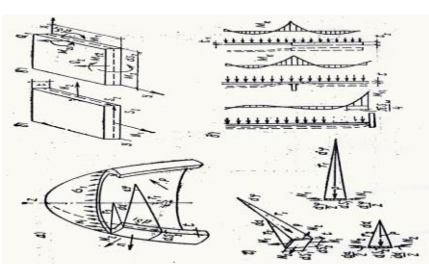

***Fig. 2**. Drawing for calculation of sheet steel structures*

Design of reservoir type projects up to 30000m3 was developed and construction technology was developed using roll sheets. Reservations up to 10000m3 are considered to be 18m in height and 5000m3 - 15m in size. The following wall sheet with a size of 1500x6000mm is used. After welding the edges to the weld, it is 1490x5980mm, so the wall height should be several times the width of the sheet, equal to the length. When preparing large tanks, the sheets are increased in size to reduce welding 2000x8000mm. It is also possible to use effective steel sheets for the construction of tanks with a capacity of 50,000 m3 or more, for this purpose, reinforcing the bottom of the wall by wrapping a high-wire or ribbon or installing a second layer.

4 CONCLUSION

Calculation of wall strength is a lifting element of the reservoir wall, which is calculated by the boundary conditions in accordance with the requirements of the Construction Norms2.03.05–97. Using the momentum theory of reservoir wall stability, it is assumed that only compressive forces are generated by the pressure of water and excess gas.
The computational pressure that is created by the wall at height "x" is determined by the following formula.

$$P_x = \gamma_{жс}(h-x)\gamma_{f1} + P_u\gamma_{f2} \quad (4)$$

Where: $\gamma_{ж}$ is the volume weight of a liquid.
γ_{f1} = Reliability coefficient on load 1.1.
γ_{f2}=Reliability coefficient on load 1.2.
$P_и$ –pressure from excess gases.

The voltage within the cylindrical shell is twice as large as the meridian, so the thickness of the wall is determined by the following formula.

$$t_u = \left[\gamma_{f1}\gamma_{жс}(h-x) + \gamma_{f2}P_u\right] {r_2}\big/{\gamma R_s} \quad (5)$$

Wall deflection can be determined by the following formula:

$$y = \Delta r = \left[\gamma_{жс}(h-x) + P_u\right]{r_2}\big/{Et_w} = {P\cdot r_2^2}\big/{Et_w} = \frac{P}{K} \quad (6)$$

here; $K = \frac{Et_w}{r_2^2}$ - Ratio of the basis.

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