DENSITY MEASUREMENTS FOR SHIELD

B.U.G'aibnazarov
master's dagree student of
Tashkent State Technical University
e-mail: boburjonboburjon22@gmail.com
cell-phone: +998-97-790-93-69

The density of substances is one of the main parameters characterizing the quality of the technological product, and in some cases, its composition. Automatic density measuring devices are important elements in complex automation of a number of processes in chemical, food and other industries. For example, control and management of evaporators, absorbers, distillation, rectification and other equipment requires continuous measurement of density.

In some production, the density of liquids is measured to determine the solute concentration.

The ratio of the mass of a substance to its volume is called density. – **ρ** (kg/m^3)

Density is an important quality indicator in most products. Density is the amount of mass per unit volume.

ρ =m/V – the mass and volume of the object in **m**(kg) and **V**(m^3) are calculated by the density formula.

In the SI system, density is measured in kg/m^3. Density is a temperature-dependent parameter.

The density of the liquid should be indicated at normal temperature (20 ^{0}C). At this temperature, the liquid is determined using the following formula:

$$\rho_{20} = \rho_t[1-\beta((20-t)]$$

where ρ_t is the density of the liquid at the working temperature, kg/m^3;

β- average coefficient of volume expansion of liquid 1/ºC, t-temperature of liquid, ºC.

The density of the liquid depends on the temperature.

The following methods are used to calculate the density: weight, hydrostatic, radioisotope and shielding methods are the most widely used density measurements in industry.

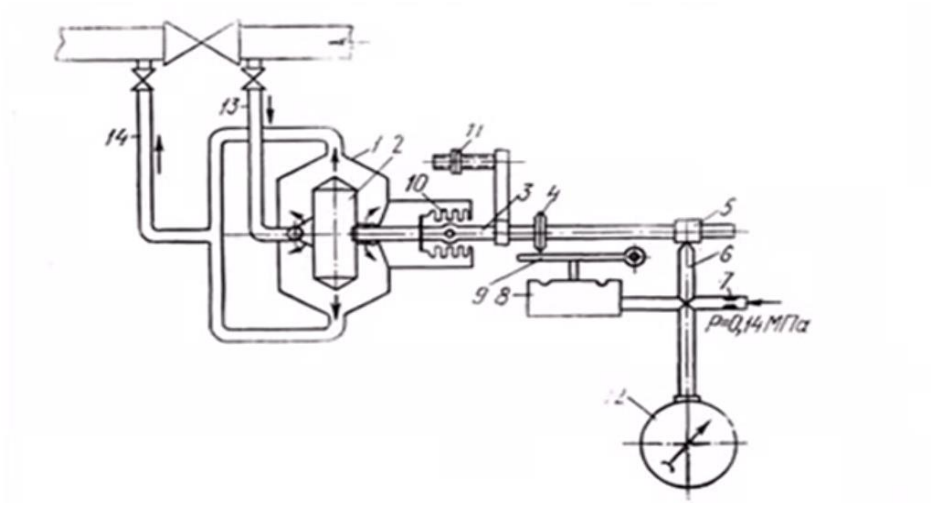
The principle of operation of gravity measuring instruments is based on the continuous weighing of a certain constant volume of the controlled liquid. In addition to measuring the density of pure liquids, weighted density

meters are also used to measure the density of suspensions and liquids containing solids.

We will explain below what the shielded density measuring devices are. Shield density meters use Archimedes' dependence of the repulsive force acting on the shield on the density of the liquid. These devices have both floating and submersible shields. In the first type of instruments, the quality of density measurement depends on the depth of immersion of the shield. In the second type of devices, the depth of immersion of the turtle does not change, only its pushing force is measured, and this force is proportional to the density of the liquid.

In the first type of densitometers, the weight of the flask is balanced by the pushing force exerted on the flask by the medium with density ρ, which is being checked, and the medium with density ρ^0 on the surface of the liquid. When the turtle is in equilibrium, the pushing force is equal to the weight of the turtle. In this case, each value of the examined critical density corresponds to a certain depth of immersion of the turtle. The expression of the pushing force for a constant section shield is as follows.

F=ρ



1- scheme of a density meter with a pneumatic switch with a sinking shield.

In this device, in the image of a pressure drop created by a valve or other narrowing device, a pneumatic transducer of density measurement is used, the liquid comes from the pipe 13 through the ring distributor to the measuring chamber 1, and is transferred from the pipe 14 to the pipe prota with the help of outlet pipes. Such a direction of the liquid loses the image displayed on the shield 2 of the flow rate. It is installed at the end of the box that passes through the silifon 10, which is spherical with a shield. This action is balanced by 11. The gauge is adjusted in such a way that the lower limit of the measuring device with the lowest density of the flask begins to move

down into the liquid. With the increase in density, the shielded multiplier rises under the influence of the repulsive force and the balance in the system is disturbed. The balance is restored using a pneumatic switch.

REFERENCES:

1. RSICC Computer Code Collection, "CCC-660 Monte Carlo N-Particle Transport code system".

2. R. Nunez-Lagos and A. Virto, Applied Radiation and Isotopes, Vol. 47, No. 9–10, pp. 1011, 1996.

3. G. Braoudakis, et al., Nuclear Instruments and Methods, Vol. A, No. 403, pp. 449, 1998.

4. M. Amin, O. Alharby, A. Alabdulaly, A. Alsary, S. Alsid, and M. Edres, "The properties and application of white sand in Riyadh area, report," KACST, 1997.

5. R. C. Smith, T. L. Honkala, and C. K. Andres, Masonry: Materials Design Construction, 1979.