

# Density Kits And Under-Weighing Hooks: What Does it all mean?

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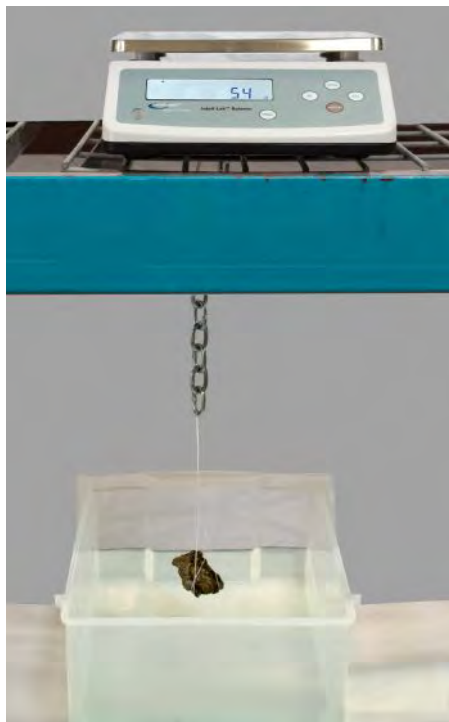
At some time, you have probably come across requests for Under Weighing Hooks or Below Balance Weighing. There are many lucrative areas in industry where under weighing capability can be useful in getting a sale, yet this is a large section of the weighing business that is neglected by many.

Of course, many balances have the ability to “under weigh” by the use of a hook that is connected to the weighing mechanism, and much of the time this is used only to weigh items that are too large or bulky to fit on the platform or in the weighing chamber on an analytical balance.

But there is another sector of weighing that is more complex; Density Determination. In this field, we look for the density of our material by using Archimedes Principle of weighing the item in air and then in a liquid.

One of the largest industries to use this method of testing is the construction business. They use this for identifying the density of anything from Bitumen in road surfaces, concrete, to core samples taken from the ground where construction is going to take place. Here, they will weigh the core sample suspended from the under-weighing hook, (normally in a basket with holes) in air and then, using a bath of water, suspend the core in the water and weigh it again. (Still in the basket).

This can be accomplished by using the formula to the right:



*Using a hook connected to the weighing mechanism for density of large or bulky items such as core samples for construction.*

An object is weighed in air and found to have mass  $m = 500$  g

It is then submerged in water and found to

have apparent mass  $m_2 = 420$  g

It is clear that it has displaced  $m - m_2 = 80$  g of water. Since water has a density of 1 gram/cm<sup>3</sup>, this implies:

$$\text{Volume of object} = m_2 = 80 \text{ cm}^3$$

The density of the object is

$$\text{then } \rho = \frac{m}{v} = \frac{500}{80}$$

$$\rho = 6.25$$

A bit complicated? With use of a suitable “Below Balance Weighing” device, these measurements are easy to accomplish. The balance will not see the weight of the water, just the effect of the water on the object. Note! For correct results, the water should be free of contaminants and the temperature of the water is a variable that should be taken into account.

Selling one of these “under balance weighing” balances or scales is not difficult; the customer almost always is familiar with the formulas. For instance, in the construction business the state has already specified the tests and interestingly, what weighing equipment to use. (Certainly 0.1 g and capacities varying from 3000 g up to 20,000 g).

Density is required for many industries; all

Example:

$\rho$  = Density

$m$  = Weight or Mass in Air

$m_2$  = Weight in Water





*Density Determination Accessory Kits are available for various types of material. Some kits include density programs.*

you need to do is know which balances have under-weighing capability or, in the case of analytical balances, which ones can have the density kit fitted. The more sophisticated balances have a density program included, so your end user can easily input the data he needs to get an accurate and consistent result. Many low capacity balances, such as analyticals, have density kits that can be purchased, simpli-



*The density of an item can be found by using the Archimedes Principle of weighing the item in air and then in a liquid.*



*The need to determine density is found in many industries and the assembled density kit makes it easy to accomplish.*

fy the process even more. In fact the more sophisticated balances have a density program to lead users through the process.

So! That is density in solids. There is some scratching of heads when we talk about densities in liquids. How can you do that???

Well, instead of suspending the object in a liquid such as water, you suspend an object of a known weight in the liquid to be tested, sometimes known as Gravimetric Displacement.

In conjunction with the Density Kit, the optional glass sinker enables you to determine the density of liquids. The difference of the weight of the sinker in air and in the liquid is used to calculate the density.

Fortunately, we scale people don't have to know the math, just that density is easy to supply to your customers, provided you have under-weighing or density kits available.

To recap, the area of density determination will bring you good sales, if you talk "under-weighing" or "below balance weighing". You can always call us for assistance with a particular application.

Fortunately, we scale people don't have to know the math, just that density is easy to supply to your customers, provided you have under-weighing or density kits available.

#### **About Intelligent Weighing Technology, Inc.**

*Intelligent Weighing Technology supplies a complete range of high-quality laboratory balances, industrial scales, load cells, and weighing accessories to the North American dealer market. Its leadership team has more than 70 years' experience in the weighing and measurement business, both in the USA and worldwide. With its 8,000 square foot facility, Intelligent Weighing Technology offers increased product inventory for faster shipping. Built on a cornerstone of quality, precision, and service, Intelligent Weighing Technology provides its customers with the equipment they need, right on time.*