



Minimum Sample Weight Guide

A complete guide to helping you to understand the concept of Minimum Sample Weight.



Minimum Sample Weight

Minimum sample weight is one of the least understood concept in weighing.

The percentage error of a weighed result increases as the sample weight you wish to weigh decreases.

At some point as the sample weight decreases the % error will increase to a point where the weighing is no longer considered accurate.

The point at which this occurs is ultimately down to you, since all customers are different and have different sensitivities to error in their process. For example a pharmaceutical company weighing out expensive components will have a different requirement to error as a baker weighing out yeast to make bread.

Manufacturers do not specify a minimum sample weight for their balances for this reason.

USP 41 have laid down guidance on calculating the minimum sample weight for pharmaceutical manufacturers. However, for those who do not have to adhere to these regulations, we have generated a "rule of thumb" to provide you with guidance in this area.



Understanding Minimum Sample Weight

To illustrate the concept of minimum sample:

If you had a set of bathroom scales that had a specification of 100kg x 0.1kg
(100g)

These scales increment in steps of 0.1kg (100g). So if you applied 300g to the scale the display will respond and a weight will be displayed, however I think most people would intuitively know that you cannot weigh 300g accurately on a set of bathroom scales – you would need a balance to do this.

This does then beg the question at what point can a weighing on a set of bathroom scales be considered accurate?

500g? 1kg? 5kg? 10kg?

The percentage error of a weighed result increases as the sample weight you wish to weigh decreases. On the next page of this guide is a table which helps illustrate this point



Example: 200g x 0.01mg Balance

Sample weight	Percentage Error*
200g	0.000 005%
100g	0.000 01%
50g	0.000 02%
10g	0.000 1%
1g	0.001%
0.5g (500mg)	0.002%
0.2g (200mg)	0.005%
0.1g (100mg)	0.01%
0.05g (50mg)	0.02%
0.02g (20mg)	0.05%
0.01g (10mg)	0.1%
0.005g (5mg)	0.2%
0.002g (2mg)	0.5%
0.001g (1mg)	1%

* Note this data is being used for illustration only and in all probability would not be relevant to your 0.01mg balance



Understanding Minimum Sample Weight

Using a table similar to the one provided on the previous page may help you determine at what point a weighing would be considered accurate for your process.

Can you use a tare container to bypass the minimum weight level set for a balance?

No.

If your balance had a calculated minimum sample weight of 25mg and you wanted to weigh 10mg. A customer may think that applying a 50mg tare vessel will take them above the minimum threshold allowing you then to weigh the 10mg accurately. No, this concept does not relate to the point at which you weigh in the range of the balance, it relates to the weight of the sample you wish to weigh.

Using the above analogy of the bath room scale: 100kg x 0.1kg
(100g)

You wish to weigh out a 300g sample

You step on to the bathroom scales and it reads say 80.1kg, you then try to weigh in your 300g sample. Intuitively you know that this is not accurate weighing



USP 41

The United States Pharmacopoeia have defined a formula for calculating the minimum sample weight for a balance.

This regulation is only relevant to pharmaceutical manufacturers where substances are to be accurately weighed for Assay

The calculated minimum sample weight for a balance is very much dependant on balance performance and the environment the balance is being used. As a result the test required to calculate the minimum sample weight must be performed onsite at the customer premises.

However, we realise that this is not helpful to customers wishing to buy a balance, so we have created a calculator which gives an indication of the minimum sample weight that could be achieved on a balance.

It must be stressed however this is just a guide for reference – the final minimum sample for your balance can only be calculated onsite once purchased.



Minimum Sample Weight Guide

Based upon our years of experience in weighing we have created the following rule of thumb. It is a good place to start if you are unsure of what to expect, however ultimately it is the customer's responsibility to define their requirements.

Balance	Perfect Conditions	Good Lab Conditions	Less Ideal Conditions
0.0001mg (7 place)	0.082mg	0.35mg	1mg
0.001mg (6 place)	0.82mg	3.5mg	10mg
0.01mg (5 place)	8.2mg	25mg	75mg
0.1mg (4 place)	82mg	250mg	750mg
1mg (3 place)	0.82g	2.5g	5g
0.01g (2 place)	8.2g	15g	30g
0.1g (1place)	82g	150g	300g