EUROPEANINSTRUMENTS

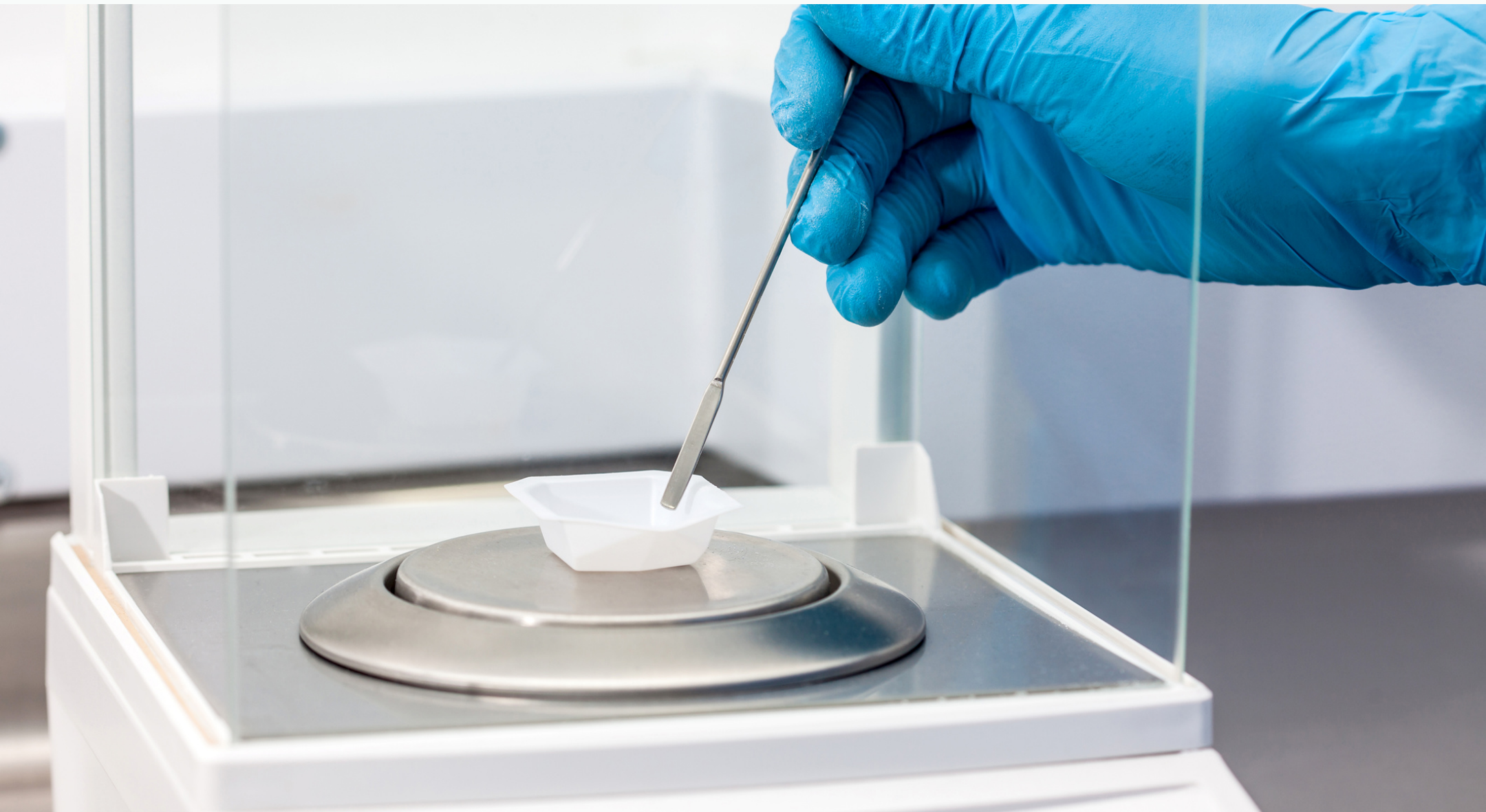
Setting Limits For Balances Guide

A complete guide to understand how to set limits for your balances.

Setting limits for balances is probably the most important but least understood subject in weighing. This is made even more difficult because it is ultimately down to the customer to decide what is acceptable for their application.

Before addressing this subject there are two important points to cover:

- Balances are not perfect measuring devices
- Manufacturer limits



Balances Are Not Perfect Measuring Devices

There are many factors that can cause the balances to weigh less accurately, below are just a few:

Temperature
Vibration
Humidity
Quality of the instrument
The age of the balance

The above factors can significantly affect the performance of your balance and so the accuracy of your results. This is why it is important to check your balances using an external weight and not just rely upon your routine calibration visit from your service provider.

So once you have accepted balances are not perfect and the result they display may not be exactly right. It then begs the question what is an acceptable level of error before you consider it to be not working correctly?

Manufacturer Limits

When faced with the question of specifying limits many customers refer to manufacturer limits.

THESE DO NOT EXIST FOR BALANCES!

Manufacturers do produce performance data for their balances in terms of linearity, repeatability etc. However this data has been generated on brand new equipment in absolutely perfect weighing room conditions (controlled temperature, humidity, vibration etc), these conditions simply do not exist and cannot be realistically achieved in the real world. Therefore there is a good possibility your balance will not achieve the performance as detailed in the sales literature or instruction manual and if used to set your limits you may find your balance fails your checks.

Who Sets the Limits?

The short answer is you.

All customers are different and will have different expectations from the performance of their equipment. For example a Pharma company weighing out pure substances will probably have higher expectations than a food manufacture weighing out yeast for bread.

This said there are some regulatory bodies that have defined limits for the use of balances. For example the United States Pharmacopoeia (Chapter 41) which is relevant to organisations who manufacture pharmaceuticals that sell product into the USA. This chapter defines what is an acceptable limit for linearity and repeatability (minimum weight).

Where To Begin?

There are a number of different approaches to setting limits, but ultimately they answer the same question.

What level of error in weighing can you accept before it will have a detrimental affect on the process you are using the weighed result for?

Example:

Using a 400g x 1mg balance to weigh yeast to make bread
It was found through experimentation that 200mg of yeast was the optimum amount to get the best results when baking bread.
However is was also found through trial and error :
If 200 – 220mg of yeast was used the result was acceptable (over this the bread became too yeasty
If 180 – 200mg of yeast was used the result was still acceptable (under this the bread would not rise)
Through this experimentation we have determined an acceptable level of error of +/- 20mg when weighing out 200mg of yeast before it has a detrimental affect on making bread.
For the purposes of minimising quality control issues you may wish to set limit for the balance lower than this, maybe +/- 10 mg.
So when performing your balance check using a 200g UKAS certified weight with a measured value of 200.003 a displayed result on the balance between 199.993g and 200.013g would be considered acceptable. Outside this range and corrective action would need to be taken.