

Hop Types and their choice in Beer Styles

Hop varieties fall into two types:

- aroma varieties
- bittering varieties

Aroma varieties are characterised by a more intense and pleasant aroma resulting from a higher content of certain hop oils. Although their alpha acid content is lower than that of the bittering varieties, they are usually more expensive.

Bittering varieties are characterised by a higher alpha acid content, which in the case of new varieties may be above 10%.

Aroma varieties

Hallertau
Hersbrucker
Perle
Spalt
Tettnanger
Golding
Saaz
Fuggles
Styrian Golding
Cascade

Bitter varieties

Northern Brewer
Brewers Gold
Nugget
Target
Bullion
Challenger
Northdown
Pride of Ringwood

The above list is not complete; there are many other varieties. Sometimes the classifications are not clear, as some bittering varieties have a good aroma and some aroma hops have a high alpha acid content.

The choice of which hops should be used in a beer style can be very difficult. When constructing a recipe I try and search the literature to find out what malt and hops are used in the specific style of beer. When there is no information available it often has to be guess work, but knowing the country of origin and whether the beer should have a hoppy aroma or not, the choice of hop can be narrowed down. Much also depends on the types of hop the brewery has in stock, this is often the limiting factor.

Once the hop varieties have been decided it is necessary to know how bitter the beer should be and how much hop aroma is required. The range of bitterness can be high, from 12 EBU for a Weizen to 45 EBU for a strong Ale. This information is often found while reading about the beer style. Hops added at the start of the boil will give bitterness to the beer, the aroma compounds being lost during the boil. Hops added at the end of the boil will only give aroma as there is no time to impart bitterness or for the aroma compounds to boil away.

To calculate how much bitterness the hops will give the beer the following information must be known.

Hop Utilisation

This is the percentage of the bitterness compounds that are extracted from the hop and dissolved in the wort. The figure is dependent on:

- the gravity of the wort – wort with high gravity dissolves less of the bittering compounds
- how long the wort is boiled – the longer the boil the more bittering compounds that are extracted
- vigour of the boil – the more vigorous the boil the more bittering compounds that are extracted from the hops

The figure normally used for hop utilisation is 30%.

Bitterness Calculation

You will need to know:

- the bitterness you require for your beer in EBU (European Bitterness Unit)
- the alpha acid of each hop variety
- the volume of wort at the end of the boil in litres

then you can calculate the weight in grams of each hop variety required.

Example – let us assume we have two hop varieties:

- hop A has an alpha acid of 7.8
- hop B has an alpha acid of 3.1

and each hop will contribute to 50% of the total bitterness to the beer which will be 15 EBU.

- each hop variety will contribute $50/100 * 15 = 7.5$ EBU

Volume at the end of the boil is 1100 litres.

The weight of each hop variety in grams is given by:

- (the EBU required from the hop variety * the volume of wort at the end of the boil in litres) / (alpha acid * utilisation/100) * 10
- $(7.5 * 1100) / (7.8 * 30/100) * 10 = 352.6$ grams
- $(7.5 * 1100) / (3.1 * 30/100) * 10 = 887.1$ grams

So the total weight of hops to be used is 1239.7 grams. If hops are to be added at the end of the boil to for aroma the rule is:

- if the weight of the aroma hops is 10% of the total weight of bittering hops, (in this example 124 grams) the aroma will be low.
- if the weight of the aroma hops is 50% of the total weight of bittering hops, (in this example 620 grams) the aroma will be very noticeable.

If the alpha acid of the bittering hops changes, for example with a new delivery, the weight used in the recipe must also change.

- the alpha acid changes from 3.1 to 3.5 EBU
- the new weight would be $3.1 / 3.5 * 887.1 = 785.7$ grams