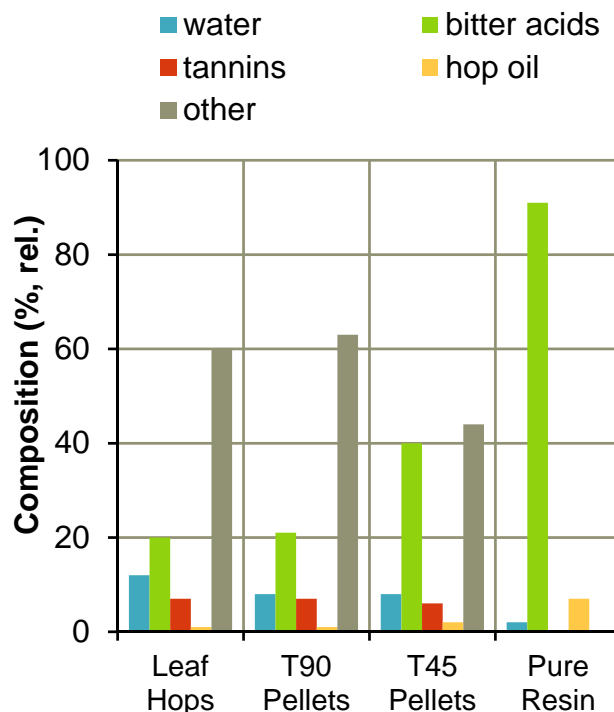


## Type 45 Pellets (Concentrated Pellets)

### ❖ Overview

- **Type 45 Pellets** are a hop product added to the wort kettle during the boiling process. These pellets contribute to the desired bitterness as well as to the characteristic hop aroma of beer.
- **Type 45 Pellets** are also perfectly suited for use on the cold side (dry hopping) of the brewing process. They impart a pronounced hop aroma to beer.
- Bitter acids and essential oils are enriched in **Type 45 Pellets** by removing some of the non-essential plant material during processing. Aside from lower transportation and storage costs, beer losses can also be reduced.



### ❖ Specifications

- Description: cylindrical pellets produced from dried, milled and pressed leaf hops
- Color\*: olive green
- Alpha acids\*: 2 – 15 %
- Beta acids\*: 2 – 14 %
- Hop oil\*: 0.5 – 7.0 ml/100g
- Moisture content: 7 – 9 %

\*dependent on variety and crop year

## ❖ Properties

### • Appearance

**Type 45 Pellets** are olive green pellets, approximately 6 mm x 10 – 15 mm in size (diameter x length).

### • Standardization

The alpha acid content of **Type 45 Pellets** can be standardized to specific concentrations during pellet production.

### • Utilization

Given as an early kettle addition (up to 15 min after the boil begins), hop utilization normally falls within a range of 30 – 35 %. When **Type 45 Pellets** are added late in the boil, utilization can decline to 20 % or less, depending on individual process conditions. Both additions can vary depending on the desired intensity and the beer style.

### • Flavor

**Type 45 Pellets** produce flavors in beer indistinguishable from those of leaf hops. **Type 45 Pellets** provide bitterness and aroma to the beer. The flavor depends on the variety, quantity and time of addition. For further information, please refer to the hop variety data sheets.

### • Quality

All Hopsteiner® products are processed in facilities which fulfill internationally recognized quality standards.

## ❖ Packaging

**Type 45 Pellets** are packaged in metallized five-layer foil bags which are then packed in boxes. These are available as 'soft' packs flushed with inert gas (N<sub>2</sub> and/or CO<sub>2</sub>) at atmospheric pressure. Pack sizes range from 2.3 kg (5 lb) to 150 kg (330 lb).

## ❖ Product Use

### • Dosage

The quantity of **Type 45 Pellets** in an addition can be calculated using the alpha acid content of the pellets and an estimated or known utilization.

Late kettle additions of **Type 45 Pellets** (typically 5 – 20 min prior to the end of the boil) reduce alpha acid utilization but increase hop aroma and flavor.

### • Addition

**Type 45 Pellets** can be added directly to the wort kettle or hop dosing vessel. Alternatively, owing to their free-flowing nature, additions of **Type 45 Pellets** can be automated.

Dry hopping normally involves the addition of **Type 45 Pellets** during secondary fermentation or maturation using various techniques.

### • Storage

**Type 45 Pellets** should be stored at low temperatures (< 5 °C or < 41 °F). Pellets in opened foil packs should be used quickly to avoid deterioration of the bitter acids and essential oils.

- **Best Before Date**

**Type 45 Pellets** are stable for five years from the date they were produced / packaged if stored under the recommended conditions.

- **Safety**

When handling this product, it is advisable to wear a dust mask. Hop pellets are combustible.

For full safety information, please refer to the relevant Hopsteiner® safety data sheet.

## ❖ Analytical Methods

- **Concentration of Bitter Substances**

Alpha and beta acids can be measured using the following methods:

- HPLC according to Analytica-EBC 7.7 or ASBC Hops-14 with the current ICE standard
- spectrophotometric method according to ASBC Hops-6A

The lead conductance value can be measured using the following methods:

- Analytica-EBC 7.4 or 7.5
- ASBC Hops-6B

- **Concentration of Hop Oil**

The hop oil concentration can be measured using the following methods:

- Analytica-EBC 7.10
- ASBC Hops-13

## ❖ Technical Support

We are pleased to offer assistance and advice on the full range of Hopsteiner® products:

- copies of all relevant analytical procedures
- Safety Data Sheets (SDS)
- assistance with pilot or full-scale brewing trials
- special analytical services

Disclaimer: The information provided in this document is believed to be correct and valid. However, Hopsteiner® does not guarantee that the information provided here is complete or accurate and thus assumes no liability for any consequences resulting from its application.