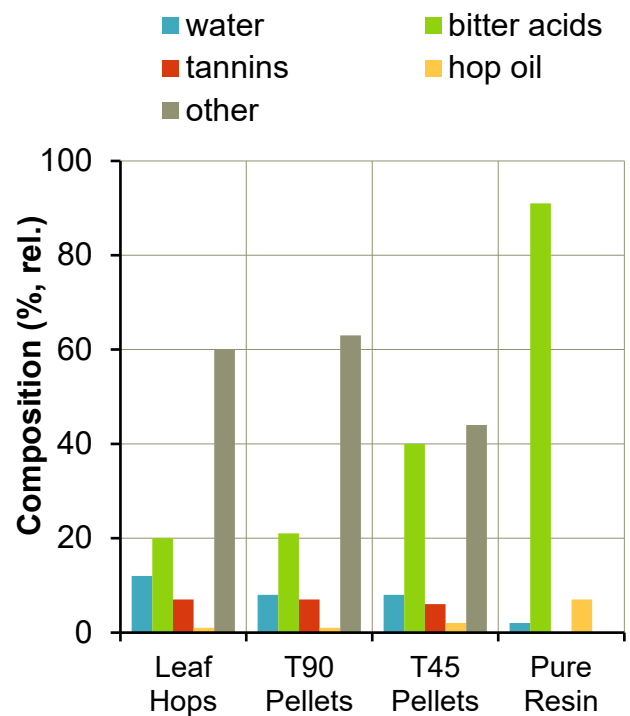


Type 45 Pellets (Concentrated)

❖ Overview

- **Type 45 Pellets** are a hop product made from leaf hops, 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: 6 – 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 (N₂ and/or CO₂) 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.

• Application

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.