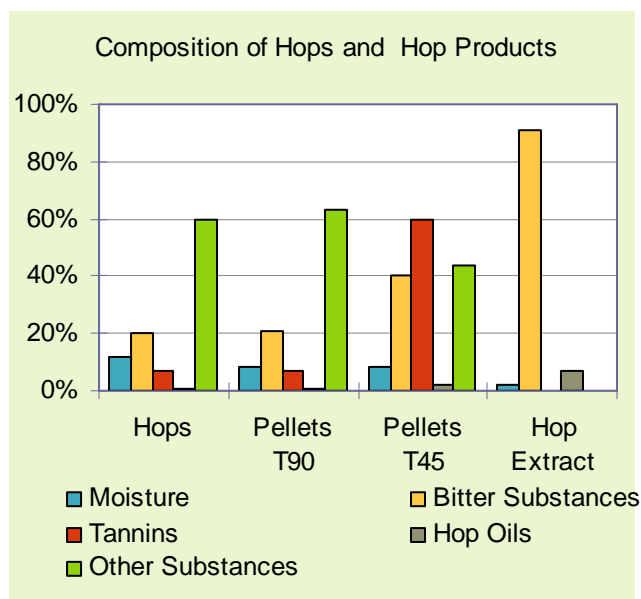


Type 90 Pellets (Standard Pellets)

❖ Overview

- **Type 90 Pellets** are a kettle-added hop product providing bitterness and hop aroma.
- **Type 90 Pellets** have virtually the same composition as leaf hops.
- **Type 90 Pellets** provide slightly improved utilization, more homogeneity, better storage stability and reduced transport / storage costs compared to raw hops.



❖ Specification

- **Description:** Cylindrical pellets made from dried, milled and compressed whole hops
- **Consistency:** A solid which normally breaks up into a powder (variety dependent)
- **Color:** Typically olive-green (depending on variety)
- **Alpha-acid:** Typically 2 – 15 % α -acids (dependent upon hop variety)
- **Beta-acid:** Typically 1 – 10 % β -acids (dependent upon hop variety)
- **Hop oils:** Typically 1 – 3 % of product but hop variety dependent
- **Moisture:** Typically 7 – 9 %

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❖ Properties

□ Appearance

Olive-green, pellets approximately 6 mm x 10 – 15 mm in size (diameter x length); pellets should be smooth but not dark and 'glassy' in appearance.

□ Utilization

As an early kettle addition (up to 15 min. after start of the boil), utilization of α -acids into beer is normally in the range 30 % - 35 %. When **Type 90 Pellets** are added late in the boil, utilization can reduce to 20 % or less, depending on the specific process conditions.

□ Flavor

Type 90 Pellets produce beer flavor indistinguishable from that produced from leaf hops.

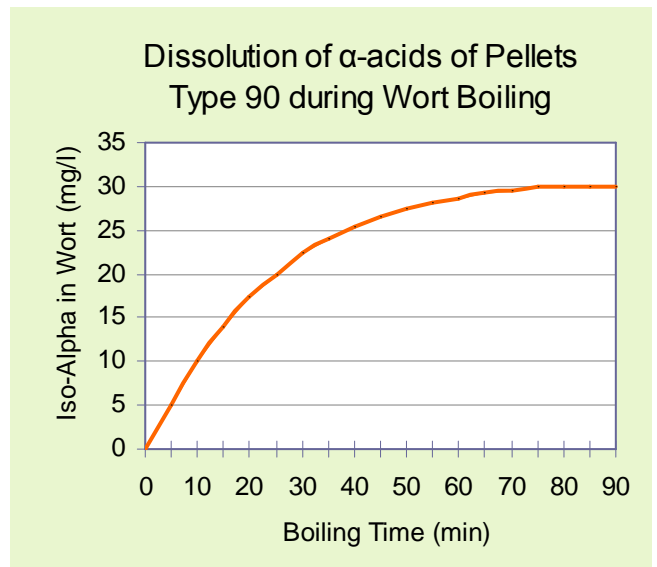
□ Quality

All Hopsteiner® products are produced in plants accredited to internationally accepted quality standards.

❖ Packaging

Type 90 Pellets are normally packed in laminated polythene/metallised polyester foils within cartons either as 'hard' packs under vacuum or as 'soft' packs under inert gas (N_2 or CO_2) at atmospheric pressure. Pack sizes range from 2kg (4.5 lbs) to 150 kg (330 lbs).

Normal pack size in the US is 20 kgs (44 lbs).



❖ Product Use

Type 90 Pellets are used in similar ways to leaf hops, contributing bitterness and hop character to beer.

□ Dosage

The quantity of pellets to be added can be calculated using the pellet α -acid content and an estimated utilization of 30 – 35 %. To establish the impact on beer aroma, trial brews are recommended as the quality and quantity of hop oil content will vary between varieties.

□ Addition

Type 90 Pellets can be manually weighed and added directly into the kettle. Alternatively, owing to their free-flowing nature, the addition of **Type 90 Pellets** can be automated with the attendant labor saving benefits.

❑ **Storage**

Type 90 Pellets should be cool stored at < 5°C (41°F). Opened foils/cartons should be used quickly to avoid deterioration of bitter acids and essential oils.

❑ **Best Before Date**

Type 90 Pellets are stable 2 years from date of production.

❑ **Safety**

If dust is generated, it is advisable to wear a dust mask. Hop pellets are a combustible material.

For full safety information please see the relevant Steiner material safety data sheet.

❖ **Analytical Methods**

❑ **Concentration of α - and β -acids**

α - and β -acids can be measured by any of the following:

- ASBC Spectrophotometric method (Hops-6) - (α - and β -acids)
- IOB method 6.4 - (α -acid)
- EBC method 7.5 - (α -acid)
- By HPLC, using the current ICE standard, according to the EBC 7.7 method, IOB method 6.5 or the ASBC method (Hops-14) - (α - and β -acids)

❑ **Concentration of Hop oils**

Hop oil concentration can be measured by the following methods:

- IOB 6.3 method
- ASBC hops-13

❖ **Technical Support**

We will be pleased to offer help and advice on the full range of Hopsteiner® products:

- ❑ Copies of all relevant analytical procedures
- ❑ Material Safety Data Sheets (MSDS)
- ❑ Assistance with pilot or full brewery trials
- ❑ Specialist analytical services