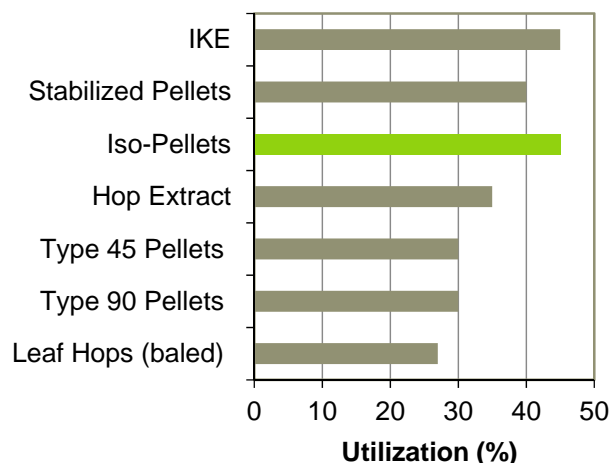


Isomerized Pellets (Type 90 and Type 45)

❖ Overview

- **Iso-Pellets** are a hop product added to the wort kettle during the boiling process. They offer a higher yield as a result of pre-isomerization of the alpha acids during the production process. Iso-merization is induced by adding a small amount of food-grade MgO during processing followed by warm storage of the packaged pellets.
- **Iso-Pellets** can replace conventional bittering and aroma products without impacting beer quality. Substantial cost savings are possible with pre-isomerized hop products. In addition, isomerized pellets have a long shelf life.

Typical utilization of kettle hop products



❖ Specifications

- Description: cylindrical pellets made from dried, milled and pressed leaf hops; most of the alpha acids in these pellets have been converted to iso-alpha acids
- Color*: dull green
- Iso-alpha acids* 1 – 25 %, a minimum of 90 % of the original alpha acids are converted to iso-alpha acids
- Beta acids*: 1 – 14 %
- Hop oil*: 0.2 – 7.0 ml/100g
- Moisture content: 7 – 9 %

*dependent on variety and crop year

❖ Properties

• Appearance

Iso-Pellets are dull green pellets, approximately 6 mm x 10 – 15 mm in size (diameter x length).

Iso-Pellets are slightly harder than standard pellets, but bulk pellets should break apart easily when the package is opened.

• Standardization

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

• Utilization

Utilization of **Iso-Pellets** (including late kettle additions) normally falls within a range of 45 –55 % as determined by HPLC.

• Flavor

Brewing trials comparing the two types of pellets and backed up by extensive practical experience, demonstrate that beers with identical flavor profiles can be produced when **Iso-Pellets** are used in place of standard pellets. 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

Iso-Pellets are packaged in metallized five-layer foil bags which are then packed in boxes. These are available 'soft' packs flushed with inert gas (N₂ and/or CO₂) at atmospheric pressure. Pack sizes range from 5 kg (22 lb) to 18 kg (44 lb).

❖ Product Use

Iso-Pellets are used in a similar way to standard pellets, contributing bitterness and hop aroma to beer.

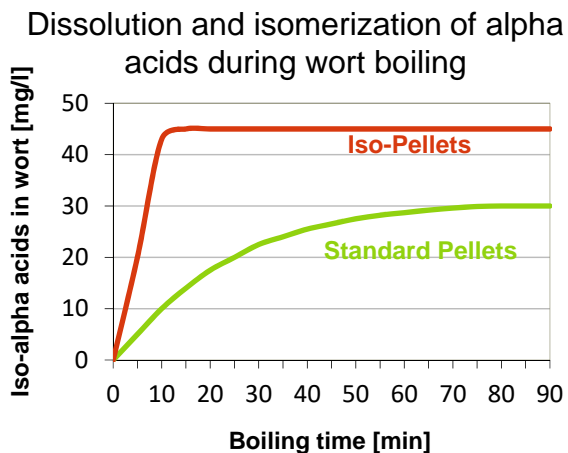
• Dosage

The quantity of **Iso-Pellets** in an addition can be calculated using the iso-alpha acids content of the pellets and the assumption that utilization, due to pre-isomerization of the alpha acids, is likely to be approximately 50 % higher than that achieved with standard pellets.

Late kettle additions of **Iso-Pellets** (typically 5 – 20 min prior to the end of the boil) result in the same utilization, but increase hop aroma and flavor.

• Addition

Iso-Pellets can be added directly to the wort kettle or hop dosing vessel. Alternatively, owing to their free-flowing nature, additions of **Iso-Pellets** can be automated. However, measures should be taken to avoid prolonged exposure to air in any bulk handling system. A contact time of about 10 minutes in boiling wort is sufficient to achieve maximum utilization.



- **Storage**

Iso-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**

Iso-Pellets are stable for six 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.

❖ **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.

❖ **Analytical Methods**

- **Concentration of Bitter Substances**

Iso-alpha, beta and residual alpha acids can be measured using the following methods:

- HPLC according to Analytica-EBC 7.11 or ASBC Hops-15 with the current ICS and ICE standards

- **Concentration of Hop Oil**

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

- Analytica-EBC 7.10
- ASBC Hops-13