



PELLETS TYPE 45 (Concentrated Pellets)

OVERVIEW

- Type 45 Pellets (P45) are usually added to the brew kettle to provide bitterness (early addition) and hop aroma (late addition). They can also be dosed further downstream into the whirlpool, fermenter or maturation tank for special aroma extraction (dry hopping).
- In P45, the lupulin glands (and thus the hop bitter acids and essential oils) are concentrated by the removal of some of the non-essential plant material (plant cellulose, lignin, etc.) during processing.
- They provide improved utilization, more homogeneity, better storage stability and significantly reduced transport/storage costs compared to raw hops.

PROPERTIES & SPECIFICATIONS

- **Appearance*:** Cylindrical, olive-green pellets, 6mm x 10-15mm in size (diameter x length). Made from dried, milled and compressed whole hops. Surface should be smooth but neither dark nor 'glassy'. Breaks up into powder when pressure is applied to solid form.
- **Alpha acids*:** 4 – 20%
- **Beta acids*:** 2 – 15%
- **Hop oils*:** 1 – 6%
- **Moisture:** 7 – 9%
- **Flavor:** aroma and bitterness profile of the used raw hop variety are fully retained.
- **Packaging:** P45 are usually packed in laminated foils of 5 kg each, within cartons, either as 'hard' packs under vacuum or as 'soft' packs under inert gas (N₂ and/or CO₂) at atmospheric pressure.

PRODUCT USE**

- **Application**
Type 45 Pellets are used in similar ways as leaf hops, contributing bitterness and aroma character to beer. Due to their higher concentration compared to P90, dosage can be lower and thus reduce beer losses. P45 can be manually weighed and added directly to the kettle or during later stages of the brewing process. Alternatively, the addition can be automated with dosing systems.
- **Utilization**
As an early kettle addition (up to 15 min. after start) utilization in the range of 30% to 35% is normally achieved. When P45 are added late in the boil, utilization can decrease to 20 % or less, depending on the specific process conditions.
- **Dosage**
P45 addition volumes to wort are typically based on the desired bitter intensity in the beer (IBU). Depending on the brewhouse utilization, bitter substances should be added accordingly. The same applies to aroma additions, whereas the connected bitterness levels need to be considered.
- **Analytical Methods**
Alpha and beta acids are usually measured by the EBC method 7.5 or ASBC Spectrophotometric method. Hop oil content is measured by EBC 7.10 or ASBC Hops-13.
- **Storage & Best Before Date**
Recommended storage is at < 5°C in sealed foils. Opened foils/cartons should be used quickly and stored below 5°C to avoid deterioration of the bitter acids and essential oils. If in sealed containers, shelf life is five (5) years.

*) depending on hop variety

**) for safety information, please refer to MSDS