

## Enriched Hop Pellets (Type 45 Pellets)

Enriched Hop Pellets are a hop product added to the kettle to provide bitterness and a hop character that is indistinguishable from that achieved using raw hops. With Enriched Hop Pellets, the hop bitter acids and hop oils are concentrated by the mechanical enrichment of lupulin. They provide improved homogeneity, better storage stability and reduced storage/transport costs compared to raw hops. Enriched Hop Pellets produce a beer flavour which is not distinguishable from that produced from leaf hops. Supported by a long history of safe use in brewing, and in accordance with US FDA regulation 21 CFR 170.30(c) and 170.3(f), hop pellets are generally recognised as safe (GRAS).

### Product Specifications<sup>1</sup>:

Description:	Cylindrical pellets of approx. 6 mm (0.24 inch) diameter, milled and compressed whole hops
Consistency:	A solid which normally breaks up into a powder
Colour:	Typically from dark-green to olive-green (depending on variety)
$\alpha$ -acids:	Typically 4 - 16% (depending on variety and crop year; standardisation is possible)
$\beta$ -acids:	Dependent upon raw hops
Hop oils:	0.4 - 3.5 mL/100 g (depending on variety and crop year; standardisation is possible)
Moisture:	7 - 12%

### Process Specifications:

Drying temperature:	< 60 °C (140 °F), depending on raw hop moisture content
Pelletising temperature:	< 55 °C (131 °F)
Temperature of pellets after cooling:	< 20 °C (68 °F)

### Quality and Food Safety:

The Barth-Haas Group maintains quality management systems registered to the ISO 9001 standard, as well as food safety management programs based on internationally recognised (HACCP) principles. Please refer to our web site ([www.barthhaasgroup.com](http://www.barthhaasgroup.com)) for more information on our systems and programs.

### Product Use:

For efficient provision of bitterness, the pellets should be added to the wort at the beginning or up to 15 minutes after the start of the boil. Utilisation of  $\alpha$ -acids into beer depends on the boiling system and conditions and is normally in the range of 30% - 35%. Added late into the boil, utilisation of  $\alpha$ -acids diminishes as the utilisation of the aroma improves giving a characteristic

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<sup>1</sup> Further information on hop varieties is available at [www.barthhaasgroup.com](http://www.barthhaasgroup.com), or at [www.deutscher-hopfen.de](http://www.deutscher-hopfen.de).

hop flavour in the beer. The quantity to be added is calculated using the  $\alpha$ -acids content and the estimated utilisation. For aroma, the quantity to be added should preferably be calculated using the oil content of the product. Pellets can be dosed automatically.

**Packaging:**

Pellets are packed in laminated foils with an aluminum layer as a barrier against diffusion of oxygen. They are sealed under inert gas or vacuum packed. The foil material used meets all food industry packaging regulations. The residual oxygen content in the foil packs is less than 2% by volume. Pack sizes are available from 2.5 kg to 140 kg.

**Storage and Best-by Recommendation:**

Type 45 Pellets should be stored cold at 0 - 5°C (32 – 41 °F) and are best used within 3 years after processing. If stored at -20 °C (-4 °F) they should be used within 5 years. Foils, once opened, should be used within a few days to avoid deterioration of bitter acids and essential oils.

**Analytical Methods:**

The determination of  $\alpha$ -acids comprises three types of methods, the specific measurement of  $\alpha$ -acids by means of HPLC, spectrophotometric, or conductometric methods:

$\alpha$ -acids can be measured by any of the following methods:

- EBC method 7.5 - ( $\alpha$ -acids as lead conductometric value (LCV))
- ASBC Spectrophotometric method (Hops-6) - ( $\alpha$  and  $\beta$ -acids)
- By HPLC, using the current ICE standard, according to the EBC 7.7 method, or the ASBC method (Hops-14) - ( $\alpha$  and  $\beta$ -acids)

Hop oil concentration can be measured by:

- EBC 7.10
- ASBC Hops-13

**Safety:**

If dust is generated, it is advisable to use a dust mask. Hop pellets are a combustible material. For further information please download the relevant Safety Data Sheet (SDS).

**Technical Support:**

We will be pleased to offer help and advice on the use of Enriched Hop Pellets in brewing.