



# Hop Pellets (Type 90 Pellets)

## CHARACTERISTICS:

Type 90 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. They can also be used post-fermentation for dry hopping. Pellets provide improved homogeneity, better storage stability and reduced storage/transport costs compared to raw hops. They produce a beer flavor 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 recognized as safe (GRAS).

## PRODUCT SPECIFICATIONS\*

<b>Description</b>	Cylindrical pellets of approx. 6 mm (0.24 inch) diameter, milled and compressed whole hops
<b>Consistency</b>	A solid which normally breaks up into a powder
<b>Colour</b>	Typically from dark-green to olive-green (depending on variety)
<b><math>\alpha</math>-acids</b>	As in raw hops, depending on variety and crop year
<b><math>\beta</math>-acids</b>	As in raw hops, depending on variety and crop year
<b>Hop oils</b>	As in raw hops, depending on variety and crop year
<b>Moisture</b>	7 – 12 %

\* Further information on hop varieties is available at [www.barthhaas.com](http://www.barthhaas.com)

## QUALITY AND FOOD SAFETY:

Barth-Haas 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.barthhaas.com](http://www.barthhaas.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. Utilization 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, utilization of  $\alpha$ -acids diminishes as the utilisation of the aroma improves giving a characteristic hop flavor in the beer. The quantity to be added is calculated using the  $\alpha$ -acids content and the estimated utilization. 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 and/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 1 kg to 500 kg.

**STORAGE AND BEST-BY RECOMMENDATION:**

Type 90 Pellets should be stored cool at 0 – 5 °C (32 - 41 °F). Pellets are best used within 3 years after processing. If stored at -20 °C (-4 °F), pellets 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.

**HOP DETERIORATION DURING STORAGE AND SHIPPING:**

Hop Product	Storage at up to 30°C	Cold Storage at 3 °C
Cones (3 months storage)	22 %	5 %
Pellets (1 year storage)	12 %	3-6 %

**Table 1:  $\alpha$ -Acid losses in % relative during different storage conditions [1]**

Shipping Temperature	Alpha Losses
Up to 25°C	3-6 %
Up to 30°C	5-8 %
Up to 35 °C	6-10 %
> 35°C	Up to 15 %

**Table 2: Alpha-acid losses during overseas transportation in % relative [2]**



#### 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) from our web site [www.barthhaas.com](http://www.barthhaas.com).

#### TECHNICAL SUPPORT:

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

E-Mail: [Brewingsolutions@barthhaas.de](mailto:Brewingsolutions@barthhaas.de)

#### REFERENCE:

1. Biendl M, Engelhard B, Forster A, et al (2012) Hopfen: vom Anbau bis zum Bier. Hans Carl GmbH, Nürnberg
2. Forster A (2002) What happens to hop pellets during unexpected warm phases? Brauwelt Int 43-46