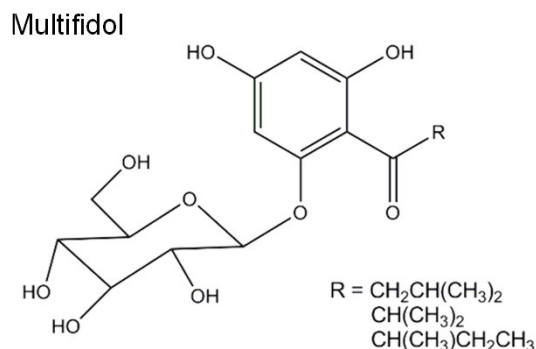
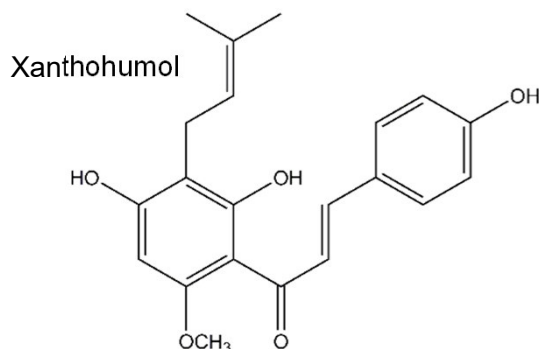


## HardResin Pellets

### ❖ Overview

- **HardResin Pellets** are a hop product added to the wort kettle during the boiling process. They impart a smooth bitterness and mouthfeel to beer.
- **HardResin Pellets** can release glycosidically bound hop compounds to impart a pleasant hop aroma to beer.
- **HardResin Pellets** are rich in antioxidative polyphenols.



### ❖ Specifications

- Description: de-bittered hop powder (from production of CO<sub>2</sub> extract) compressed into cylindrical pellets
- Consistency\*: solid, which normally disintegrates into a powder
- Color\*: pale yellow-green
- Total resins\*: 3.5 – 8.5 %
- Hard resins\*: 30 – 50 % of total resins
- Xanthohumol\*: > 0.3 %
- Hop oil\*: < 0.1 %
- Moisture content: < 9.0 %

\*dependent on variety

## ❖ Properties

### • Appearance

**HardResin Pellets** are pale yellow-green pellets, approximately 6 mm x 15 – 30 mm in size (diameter x length).

### • Flavor

**HardResin Pellets** produce a smooth bitterness. The hard resins and polyphenols in the pellets have been shown to contribute to improved mouthfeel and overall beer flavor. Moreover, key flavor compounds (e.g. linalool) released from hop glycosides produce a pleasant hop aroma.

### • Quality

All Hopsteiner® products are processed in facilities which fulfill internationally recognized quality standards.

## ❖ Packaging

**HardResin Pellets** are packaged in metallized five-layer foil bags which are then packed in boxes. These are available as 'soft' packs flushed with inert gas (N<sub>2</sub> and/or CO<sub>2</sub>) at atmospheric pressure. Pack sizes range from 2.3 kg (5 lb) to 150 kg (330 lb).

## ❖ Product Use

**HardResin Pellets** are employed to enhance the quality of the bitterness and to increase mouthfeel. **HardResin Pellets** also improve the physical stability of the finished beer through the precipitation of undesirable proteins.

### • Dosage

The quantity of **HardResin Pellets** added to the wort kettle depends on the application and will vary according to the raw materials and other hop products used in the brewing process. They can be added at any time during the boil.

To establish what impact they will have on beer flavor, brewing trials are recommended as the quality and quantity of the compounds imparting the bitterness, aroma and flavor (the latter are released from the hop glycosides) will vary among varieties. Typical additions range from 20 to 100 g/hl.

### • Addition

**HardResin Pellets** can be manually weighed out and added directly to the wort. Alternatively, owing to their free-flowing nature, additions of **Hard ResinPellets** can be automated.

### • Storage

**HardResin Pellets** should be stored at low temperatures (< 5 °C or < 41 °F). Pellets in opened foil packs should be used quickly to avoid deterioration.

### • Best Before Date

**HardResin Pellets** are stable for five years from the date they were produced / packaged if stored under the recommended conditions.

### • Safety

There are no known, serious health hazards associated with normal use. 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.

## ❖ Analytical Methods

### • Concentration of Bitter Substances

Xanthohumol, alpha and beta acids can be measured using the following methods:

- HPLC according to Analytica-EBC 7.7 or ASBC Hops-14 with the current ICE standard and pure xanthohumol (370 nm for XN)
- spectrophotometric method according to ASBC Hops-6A

Hard resins can be measured using the following method:

- Analytica-EBC 7.5

### • Concentration of Hop Oil

Due to the low amount of hop oil present in **HardResin Pellets**, the concentration cannot be measured using any of the methods currently available.

## ❖ 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.