



HVG – Ethanol Extract

Product Specification

Manufacturer

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The HVG-Ethanol extract contains the natural non-polar substances of the flower of the hops plant (*humulus lupulus*).

The HVG-Ethanol extract is a mixture of the aromatic substances of the hops (hop oils) and the bittering resins (humulones and lupulones).

According to the EBC (European brewery convention) Manual of good practice for Hops and Hop Products (ISBN3-418-00758-9) the process of gaining the extract out of the hops is the following:

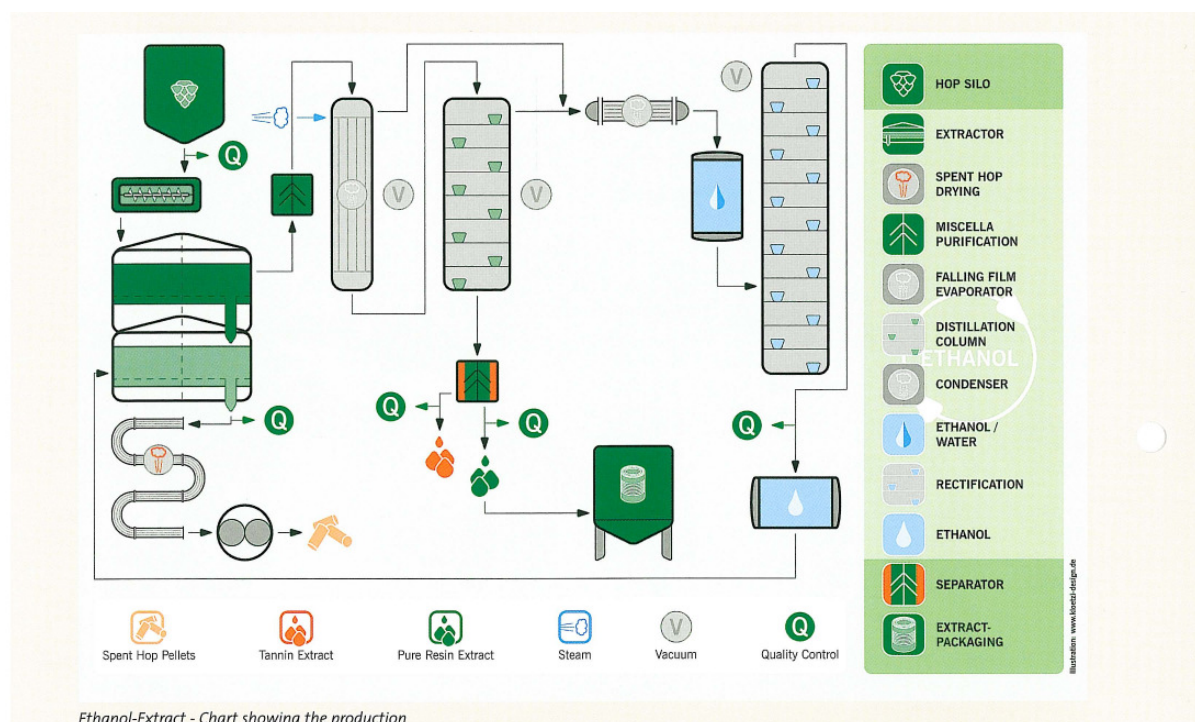
“Whole hops are mixed with a 90% ethanol and water solution in a wt grinding mill. The slurry of hop powder and ethanol is pumped into the continuous counter-current extractor. Countercurrent to the flow of hops, ethanol is constantly percolated through the hop bed and in this way it is enriched with hop components. After the hops have passed through the extractor, they leave the extraction as spent material...The solution of ethanol and polar hop material - referred to as “miscella” - is pumped to the evaporation stage. The ethanol is removed by evaporation in a multistage vacuum evaporator. The resulting raw extract contains hop acids as well as water soluble components such as polyphenols. After further reduction of the ethanol content, the raw extract is separated into resin and hot water extract by means of separators. The polyphenols polymerise due to thermal treatment.”



Utilisation of HVG-Ethanol extracts

Like the hop flowers, the HVG Ethanol Extract extract is used as a natural flavouring ingredient in the process of beer brewing. The extract should be dosed during the process of wort boiling in order to achieve the isomerisation of the humulones (alpha-acids) to iso-humulones (iso alpha acids).

Production Flowsheet



- Cleaned and coarsely milled leaf hops are mixed with ethyl alcohol
- Alcoholic solution is gained in the classic reverse flow procedure
- Solution contains whole spectrum of non polar as well as part of the polar hop fraction
- Solid particles are separated from the solution via a centrifuge.
- Concentration of the solution is obtained in an evaporator under high vacuum.
- Extract is homogenized in a collecting tank
- Filling into drums or bulk packs at the customer's wish.

Typical characterisation of extracts

α – acids (resins):	between 25% to 55% w/w dependent on the hop variety
Iso-alpha-acids:	between 0.5 – 2.0 %
β – acids (resins):	between 15% to 35% w/w dependent on the hop variety
essential oils:	up to 10 ml/ 100 g dependent on the hop variety
Solvent residue:	Ethanol content < 0.3 %

Appearance: viscous liquid. Colour dependent on the hop variety from light to dark green.



Density: from 900 g/l to 1.100 g/l

Viscosity: Flow properties changes depending on the temperature of the extract. At temperatures of about 25 °C it moves like Honey and the higher the temperature becomes, the more fluid it gets. At temperatures of about 40 °C it flows a little bit similar to Olive Oil.

Approx. 10,000 mPas at 30 °C; approx. 1,000 mPas at 50 °C

Storage / Stability

Good stability characteristics. Out of quality reasons HVG Ethanol-Extract should be used as soon as possible after opening the packaging. Hop constituents oxidise in contact with air, no hazardous reactivity known. Recommended storing conditions:

at 10 - 15 °C: up to 2 years

at 0 - 5 °C: up to 4 years

No special precautions necessary.

Health and Safety

Rubber gloves are advisable to avoid accidental contact. Protective goggles are advisable to avoid accidental contact.

Packing and Dosage

HVG Ethanol-Extract is packed into cans lined with high quality food grade lining from 0,5 Kg to 4,0 Kg extract weight. Larger packing volumes, e.g. 200 litre standard or stainless steel drums, are available for use with automatic dosing units.

Hops in the brew-house: traditionally the hopping takes place in the wort copper. The time for the dosage varies from the first-wort hopping, via the additions directly before casting, up to direct aroma hopping in the whirlpool. After being dosed the hop components pass through the following stages:

- mechanical distribution
- emulgation i.e. dissolving the components
- components are transformed by heat
- evaporating volatile (partly undesired) hop oils
- partially combining with proteins and precipitation

At the same time the following processes occur during the wort boil:

- Bitter substances: alpha isomerises to iso-alpha-acid, dissolving other components of the resin fraction like the humulinic acids
- Aroma substances: dissolving, evaporation, oxidation



Yield of bitter substances

In the brewery the yield results from the ratio between the remaining bitter substances in the finished beer and the bitter substances dosed with the hops according to the following rule:

$$\text{Yield} = \frac{\text{bitter compounds in the finished beer}}{\text{bitter hops dosed in hops}} \times 100$$

and is calculated as the isomerisation rate as follows:

$$\text{Rate of isomerisation} = \frac{\text{iso-alpha-acids in wort or beer}}{\text{alpha-acids dosed}} \times 100$$

Utilisation of the alfa acids as early addition to the kettle is in the range of 25% to 45%, typically 35%.

HVG Ethanol Extract can be used as single hop addition or in combination with HVG-Hop Pellets.

Analytical Methods

For hop extracts the following analysis methods can applied to measure the alfa and beta acids:

EBC 7.6 Bitter Substances in Hop Extracts: Ganzlin Modification of the Wöllmer Method

EBC 7.7 Alpha and beta acids in Hops and Hop Products by HPLC (ASBC Hops-14)

EBC 7.8 Iso-alpha, alpha and beta acids in Hops and Hop Products by HPLC

ASBC Hops-6 Spectrophotometric method

Ethanol Extract is normally used according to its Conductometric Bitter Value. (Note: CBV = LCV (EBC 7.6) + 50 % of the iso- α -acids.)

Other information

The product is accompanied by the Phytosanitary certificate, which states that the product has been produced according to the national health regulations.

The above information is based on the current state of knowledge of our product at the time of publication and is furnished without warranty of any kind. The user must satisfy himself that the product is entirely suitable for his purposes.

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