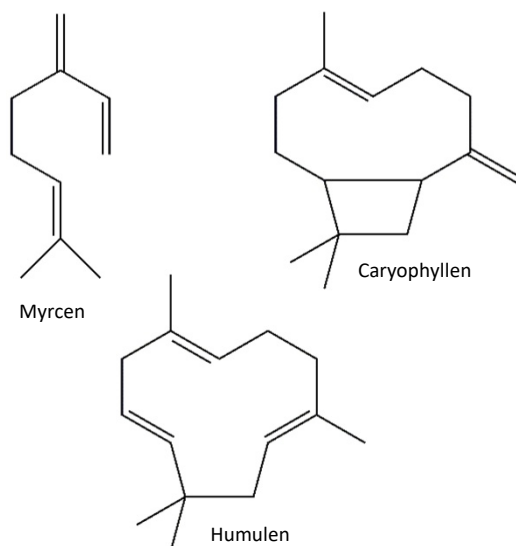


## Hop Oil – Type DRY Variety-Specific (v.s.)

### ❖ Overview

- **Hop Oil – Type DRY v.s.** is produced from leaf hops of a specific hop variety and contains the complete range of essential oils characteristic of the variety.
- **Hop Oil – Type DRY v.s.** can be added at various points in the brewing process (typically on the cold side of production) and results in improved aroma yields compared to traditional hopping techniques.
- **Hop Oil – Type DRY v.s.** imparts a typical dry-hopped aroma which varies depending on the time of the addition.



### ❖ Specifications

- **Description:** pure hop oils of a single hop variety diluted in a blend of propylene glycol and ethanol, resulting in a product diluted to 1:100
- **Key compounds\*:**

myrcene	variety-dependent
humulene	variety-dependent
caryophyllene	variety-dependent
farnesene	variety-dependent
- **Bittering substances:** < 0.1 %
- **Viscosity:** 46 mPas at 25 °C (77 °F)
- **Density:** approx. 1.0 g/ml at 20 °C (68 °F)

\*detailed information is provided in the accompanying certificate of analysis

## ❖ Properties

### • Appearance

**Hop Oil – Type DRY v.s.** is a nearly colorless, clear liquid, containing the complete range of hop essential oils.

### • Utilization

Depending on the time and point of the addition, the recovery rate for hop oil can be as high as 95 %. Actual utilization will vary from brewery to brewery due to differences in equipment and process conditions.

### • Flavor

**Hop Oil – Type DRY v.s.** can be used to provide a strong hop aroma, or alternatively, a more subtle hop aroma depending on the quantity added as well as the time and point of the addition. This hop oil contains the full range of aroma compounds present in the specific hop variety.

The intensity of the bitterness might increase depending on the quantity added.

### • Quality

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

## ❖ Packaging

**Hop Oil – Type DRY v.s.** is normally packaged in aluminum bottles of various sizes.

**Hop Oil – Type DRY v.s.** is usually supplied as a 1:100 dilution in a blend of 95 % propylene glycol and 5 % ethanol (recommended).

Other dilutions or pure hop oils may be available on request.

## ❖ Product Use

### • Dosage

The required quantity of **Hop Oil – Type DRY v.s.** diluted to 1:100 (see Packaging section) depends on the point of the addition:

Pre-fermentation:	up to 500 g per hl
Maturation tank:	50 – 300 g per hl
Prior to filtration:	1 – 20 g per hl

The dosage rates above are intended for orientation only; actual additions will depend on the intensity of the aroma desired. Trials performed by injecting oil into the beer with a microliter syringe are helpful for determining the quantity of hop oil required.

### • Addition

**Hop Oil – Type DRY v.s.** can be added at different stages of beer production. Dosing equipment which pumps the product into the beer stream is preferred for the addition of **Hop Oil – Type DRY v.s.** Alternatively, the hop oil can be added to the tank prior to filling.

• Pre-fermentation: the loss of volatile compounds during fermentation, combined with the biochemical modification of aroma compounds by yeast, can produce a less grassy aroma.

• Maturation tank: additions to the maturation tank will result in slight changes to the hop aroma, due to yeast activity.

• Prior to filtration, direct additions result in an almost unchanged flavor. However, there are certain losses of non-polar compounds.

- **Storage**

**Hop Oil – Type DRY v.s.** should be stored at temperatures < 10 °C (50 °F) in screw-top aluminum bottles.

- **Best Before Date**

**Hop Oil – Type DRY v.s.** is stable for one year from the date it was produced / packaged if stored under the recommended conditions. Packaging can be opened once per week for a period up to 1 month.

- **Safety**

Any product coming into contact with the skin should be immediately washed off with soap and water or an appropriate hand cleanser. If **Hop Oil – Type DRY v.s.** gets into the eyes, flush with copious amounts of water until clear and seek medical attention. For full safety information, please refer to the relevant Hopsteiner® safety data sheet.

## ❖ **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.

## ❖ **Analytical Methods**

- **Aroma Compounds**

Individual hop oil compounds can be analyzed by means of gas chromatography techniques using the following methods:

- Analytica-EBC 7.12
- ASBC Hops-17