YAKIMA CHIEF HOPS®

WHOLE LEAF HOPS

PRODUCT DATA SHEET

PACKAGED BY

Yakima Chief Hops
306 Division Street, Yakima, WA 98902 USA
Phone (509) 457-3200

DESCRIPTION

Whole leaf hops are the dried and pressed inflorescences of female hop plants. The cones are removed from the plants, kiln-dried to 8.5-10.5% moisture, and pressed into bales on the farms where they are grown – all within hours of being harvested in the field. Leaf hops embody the characteristics of the variety, as well as the unique aspects of their field, growing season, and farm management systems. Leaf hops are suitable for use in all stages of brewing, from kettle bittering through dry-hopping in the fermenter. They are supplied to brewers as whole, quarter, or mini bales, ready for immediate use. Leaf hops are available for most hop varieties. Informational summaries for these hop varieties are available at www.yakimachief.com

PACKAGING & STORAGE

Whole Leaf Hops are delivered in burlap or plastic-fiber mesh. Standard bales weigh approximately 200 pounds (90.7 kg) and measure approximately 56" x 16" x 26" (142.2cm x 40.6cm x 66cm). Quarter-bales (50 lbs) are sealed in a nitrogen flushed, vacuum sealed foil bag, and shipped in cartons. 11 lb portions are sold in nitrogen flushed, vacuum sealed foil bags and shipped in cartons. Whole Leaf Hops should be stored near-freezing, preferably between 30°F and 41°F (-1°C and 5°C). Under these conditions, Whole Leaf Hops will remain stable in closed containers for one (1) year in bales or three (3) years in nitrogen flushed, vacuum sealed packaging. Storage stability does vary per variety and can be negatively affected by exposure to oxygen, heat and/or light.

APPLICATION & USAGE

Whole Leaf Hops are primarily used in kettle additions to provide bitterness and hop character to beer, or in post-fermentation dry hopping applications to provide aroma and flavor. It is generally recognized that kettle hopping with leaf hops leads to improved trub formation and improved antimicrobial and anti-foaming properties. Add the Whole Leaf Hops into wort before or early into kettle boil for bitterness and the best utilization of alpha acid. Add aroma varieties late in kettle boil to maximize the aroma properties of beer. Whole Leaf Hops can be added into the brew kettle during kettle boil loose, or via custom designed dosing systems. Whole Leaf Hops can also be used for dry hopping during fermentation, although T-90 Hop Pellets are a more efficient choice for this application.

USE RATE CALCULATIONS

Addition during early kettle boil to achieve average bitterness in high gravity wort/beer will typically lead to the extraction and isomerization of about 25% of the alpha acids in the finished beer. Addition rate is thus calculated as follows: **kg product = IBU / 25 x hl / Alpha%**
Where: IBU = international bitterness unit desired, hl = is hector liters of finished beer (1 barrel = 1.173 hectoliter), Alpha % = equals alpha %w/w content from CofA as a whole number. Use rates may vary depending on the brewing process and the desired hopping level.

Addition during kettle boil to provide bitterness and/or aroma will be dependent on the time of the addition and the desired hop character in the finished beer. Hop formulation and addition rates will be determined on a case-by-case basis. Also, additional rates during or post-fermentation to reinforce aroma in beer will be determined on a case-by-case basis.

AROMA

Aromatic characteristics are variety specific. The perception of hoppy character and additional aroma descriptors in beer will also be variety specific in some instances depending on the quantity of leaf hops added and the time of addition. Aroma descriptors include, but are not limited to citrus, tropical fruit, stone fruit, pine, cedar, floral, spicy, herbal, earthy, tobacco, onion/garlic and grassy.

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SPECIFICATION SHEET

WHOLE LEAF HOPS CLASSIC

nqa. ISO 9001 ISO 14001 Registered

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DESCRIPTION	METHOD	TYPICAL ANALYSIS
Alpha Acids	UV Spectro. by ASBC HOPS-6A	2.5 - 17.5% (w/w)
Beta Acids	UV Spectro. by ASBC HOPS-6A	3.0 - 9.0% (w/w)
Hop Storage Index	ASBC HOPS-12	Varies by variety & time from harvest
Lead		< 0.6 ppm
Arsenic		< 0.4 ppm
Cadmium		< 0.1ppm
Mercury		< 0.05 ppm
Total Heavy Metals (as Pb eq.)		< 10 ppm
Pesticides	Comply with US Regulations & EC Directive 396/2005 Amendments	

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SAFETY DATA SHEET

1. PRODUCT IDENTIFICATION

1.1 Product Name	Leaf Hops (raw hop cones, whole hop cones) Dried hop cones without leaf and stem.
1.2 Supplier	Yakima Chief Hops Inc. 306 Division St. Yakima, WA 98902 (USA) Phone: +1.509.457.3200 Email: quality@yakimachief.com Website: yakimachief.com
1.3 Recommended Use	Ingredient used in brewing beer.
1.4 Restrictions on Use	None

2. HAZARD IDENTIFICATION

2.1 Hazard Classification	Not Applicable Product is natural, unrefined and contains no additives.
2.2 Label Elements	Not Applicable
2.3 Other Hazards	Dust may be a mild irritant to the eyes. Prolonged skin contact could cause dermatitis in some individuals. Dust generated during sweeping of spilled product may cause severe respiratory distress in some individuals.

3. COMPOSITION, INGREDIENT INFORMATION

3.1 Composition	Compressed dried raw hop cones.
3.2 Hazard Components	Not Applicable Product is natural, unrefined and contains no additives.

4. FIRST AID MEASURES

4.1 Oral Ingestion	Not Applicable
4.2 Eye Contact	Wash with copious amounts of water. Seek medical attention if irritation persists.
4.3 Skin Contact	Wash with warm, soapy water. Seek medical attention if irritation persists. Launder contaminated clothing before reuse.
4.4 Inhalation	Remove affected person to fresh air. Administer oxygen if necessary.
4.5 Symptoms	None Known

5. FIRE FIGHTING MEASURES

5.1 Extinguishing Media	Water, CO2
5.2 Hazards from Fire	None Known

6. ACCIDENTAL RELEASE MEASURES

6.1 Procedure	Scoop, shovel spilled material into recovery container. Flush area with hot soapy water to remove final traces.
6.2 Protective Equipment	Use adequate ventilation or a respirator if in a confined area. Use rubber gloves. Wear Safety Glasses.

7. HANDLING AND STORAGE

7.1 Handling Equipment	Closed Container of Food Grade Quality. Stainless Steel, Lacquered Steel, Laminated Aluminum Foils or PET Pouches.
7.2 Precautions	Avoid generating excessive dust and prolonged skin contact. Use personal protective equipment (Section 8)
7.3 Storage Conditions	Store in dry, odor free environment at temperature range of 30°F to 41°F (-1°C to 5°C). Prolonged exposure to high temperatures may cause foils to burst and reduce quality.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

8.1 Permissible Exposure Limits (PELs)	Not Applicable
8.2 Threshold Limit Values (TLVs)	Not Applicable
8.3 Engineering Controls	Provide adequate ventilation
8.4 Personal Protective Equipment (PPE)	Skin Protection: wear rubber gloves if prolonged exposure Eye Protection: wear safety glasses Respiratory Protection: wear face mask if dust will be generated

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Appearance & Odor	Yellow, green, or brown pellet with an herbal, pungent odor.
9.2 Odor	Typical hoppy, depends on variety
9.3 Odor Threshold	No data available
9.4 pH	No data available
9.5 Freezing Point	No data available
9.6 Boiling Point	No data available
9.7 Flash Point	No data available
9.8 Evaporation Point	No data available; Solid
9.9 Flammability	No data available
9.10 Upper/Lower Flammability	No data available
9.11 Vapor Pressure	No data available; Solid
9.12 Vapor Density	No data available; Solid

9.13 Density	Varies with Variety
9.14 Solubility in Water	Insoluble
9.15 Partition coefficient	No data available
9.16 Auto-ignition Temperature	No data available
9.17 Decomposition Temperature	No data available
9.18 Viscosity	Not Applicable; Solid

10. STABILITY AND REACTIVITY

10.1 Reactivity	Product is sensitive to oxidation in open containers in absence of inert atmosphere an/or under excessive temperatures
10.2 Stability	Product is stable under appropriate storage conditions, in closed containers and/or under inert atmosphere. (Section 7.3)
10.3 Possibility of Hazardous Reactions	None known
10.4 Conditions to Avoid	See Section 7.3
10.5 Incompatible Materials	None Known
10.6 Hazardous Decomposition Products	None Known

11. TOXICOLOGICAL INFORMATION

11.1 Acute Toxicology	None Known. Product is "Generally Recognized As Safe" (GRAS 21 CFR 182.20)
11.2 Routes of Exposure	Inhalation: No data available Ingestion: No data available Skin contact: No data available Eye contact: No data available
11.3 National Toxicology Program	Not listed on Report of Carcinogens

12. ECOLOGICAL INFORMATION

12.1 Toxicity	No data available
12.2 Potential for Persistence and Degradation	No data available. Product is all natural and biodegradable.
12.3 Bioaccumulation	No data available. Product is all natural.
12.4 Mobility in Soil	No data available
12.5 Other Effects	No data available

13. DISPOSAL CONSIDERATIONS

13.1 Product Disposal	According to regulations in force.
13.2 Packaging Disposal	According to regulations in force; for paper/cardboard, steel and PET.

14. TRANSPORTATION INFORMATION

14.1 UN Number	Non-hazardous product
14.2 Shipping Name	Leaf Hops
14.3 Hazard Class	Non-hazardous product
14.4 Packing Group	Non-hazardous product
14.5 Environmental Hazards	Non-hazardous product
14.6 Other	Product is not classified as ADR and should not be transported along with ADR classified Cargo. Product should be stored away from engines or any heat source during transportation.

15. REGULATORY INFORMATION

15.1 Regulations	Food Safe Heavy Metals, Pesticides/Herbicides/Fungicides, Nitrates, Radioactivity: Below tolerance levels. Allergenic-Free, Non GMO, Traceable
15.2 REACH	Not Applicable (No EINECS Ref.)

16. OTHER INFORMATION

16.1 Safety Data Sheet Issue Date	2015-05May-26
16.2 Safety Data Sheet Revision Date	2018-08Aug-20
16.3 Safety Data Sheet Other	