YAKIMA CHIEF HOPS™

T-90 HOP PELLETS

PRODUCT DATA SHEET

HOP PELLETS ESSENTIAL

nqa. ISO 9001 ISO 14001 Registered

PACKAGED BY

Yakima Chief Hops
306 Division Street, Yakima, WA 98902 USA
Phone (509) 456-4792, Fax (509) 453-1551

DESCRIPTION

T-90 hop pellets are produced from kiln-dried, whole leaf hop cones which have been hammer-milled into a uniform powder and pressed through a pellet die. Leaf hops vary in oil and vegetative content, so pellet compression is fine-tuned to achieve a consistent density for repeatable brewing, batch after batch. Production processes are designed to protect and preserve hop resins by continually monitoring temperature and cooling the pellet die. Hop pellets retain all of their natural lupulin and cone material, and can be used as a full replacement for whole hops having a longer shelf life, requiring less storage space, and generally being easier to handle. Pellet hops are offered to brewers in 11lb (5kg) and 44lb (20kg), light-resistant packaging which has been nitrogen flushed to ensure freshness for up to three years from production date in cold storage conditions. T-90 hop pellets can be made from any hop variety. Detailed technical data sheets for these hop varieties are available at www.yakimachief.com

PACKAGING & STORAGE

T-90 hop pellets are packaged inside polyethylene pouches and/or metallic polyester foils ranging from 11lb (5kg) to 44lb (20kg) capacities and shipped in cardboard cartons. Packaging is done with a nitrogen flush under inert atmosphere. T-90 hop pellets are packaged based on kg net weight or kg alpha acids. A complete list of packaging information can be obtained upon request. T-90 hop pellets should be stored near-freezing, preferably between 30°F and 41°F (-1°C and 5°C). They will remain stable in closed containers under the following conditions: 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

T-90 hop pellets 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 T-90 hop pellets leads to improved trub formation and wort sterilization. Add the T-90 hop pellets 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. T-90 hop pellets can be added into the brew kettle during kettle boil loose, or via custom designed dosing systems. T-90 hop pellets can also be used for dry hopping during fermentation.

USE RATE CALCULATIONS

Addition during early kettle boil to achieve average bitterness in high gravity wort/beer will typically lead to the extraction and isomerisation of 30% of the alpha acids in the finished beer. Addition rate is thus calculated as follows: **kgA = BU x HL / 3000**
Where: kgA = kg of alpha acids to add in the brew kettle, BU = the desired amount of bitterness units in the finished beer, HL = hectoliters of finished beer (1 barrel = 1.173477657999771 hectoliter). Use rates may vary depending on the brewing process and the desired hopping level

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

AROMA

Aromatic notes are variety specific. Perception of hoppy character and various related notes in beer are also variety specific in some instances and will depend on the quantity of pellets added and the time of addition during kettle boil. 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

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	METHOD	TYPICAL ANALYSIS
Alpha Acids Assay*	UV Spectro. by ASBC HOPS-6A, LCV by EBC 7.5 HPLC by EBC 7.7 (ICE-3 Std.)	2.5 - 17.5% (w/w)
Beta Acids Assay*	UV Spectro. by ASBC HOPS-6A, HPLC by EBC 7.7 (ICE-3 Std.)	3.0 - 9.0% (w/w)
% Oils By Distillation*	EBC 7.10 or ASBC HOPS-13	0.1 - 5.0% (w/w)
Hop Storage Index	ASBC HOPS-12	Varies by variety & time from harvest
Lead		< 1.0 ppm
Arsenic		< 0.5 ppm
Cadmium		< 0.03 ppm
Total Heavy Metals (as Pb eq.)		< 10 ppm
Pesticides	Comply with US Regulations & EC Directive 396/2005 Amendments	

** NOTE: Concentration dependent upon variety of hops and crop year*

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T-90 HOP PELLETS

SAFETY DATA SHEET

HOP PELLETS ESSENTIAL

nqa ISO 9001 ISO 14001 Registered

1. PRODUCT IDENTIFICATION

1.1 Product Name	Type 90 Hop Pellets (Hop Pellets) Made from dried and ground hop cones
1.2 Supplier	Yakima Chief Hops 306 Division St. Yakima, WA 98902 (USA) Phone: 1.509.453.4792 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	A solid pellet composed of ground hops, produced by pelleting milled, dried, 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 -3°C to 5°C (25°F to 41°F). Prolonged exposure to high temperatures may cause foils to burst and reduced 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 facemask 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 Rate	Not Applicable; Solid
9.9 Flammability	No data available
9.10 Upper/Lower Flammability	No data available
9.11 Vapor Pressure	Not Applicable; Solid
9.12 Vapor Density	Not Applicable; Solid
9.13 Density	Varies with production parameters
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 and/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 Toxicity	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	Type 90 Hop Pellets
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 Issue Date	2015-05May-26
16.2 Revision Date	2018-08Aug-20
16.3 Other	