



BEST PRACTICES GUIDE FOR FLEX®

Flowable Hop Product for Beer Bittering

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DESCRIPTION:

FLEX® is a special formulation derived from pure hops, and its use is designed solely to provide bitterness to beer. FLEX eliminates a significant amount of the inert materials that come with the vegetative portion of hops and hop pellets, and thereby reduces weight, handling, and residual hop material that needs to be removed from the wort during brewing. The significant benefits from FLEX include its low viscosity, which allows it to be measured and dosed easily in the brewkettle, and the reduction of hop solids from wort, greatly reducing the process loss associated with the absorption of wort by the hop vegetative material.

FLEX is designed for dosage early in the brewkettle boil and because the product provides hop alpha acids—the same as those found in whole hops and hop pellets—the isomerization of these alpha acids into iso-alpha acids is still necessary by means of the boiling process in the brewkettle.

Switching from whole hops or hop pellets to FLEX will improve the utilization of the alpha acids for beer bittering, and the brewer can take comfort in knowing that the transition can be made with little or no effect on hop aroma.



FLEX has many advantages:

1. It is stable and can be stored for two years with negligible loss of brewing value.
2. Alpha acids utilization using FLEX in the kettle is better than whole hops and hop pellets; typically, between 10% and 20%, relative.
3. FLEX is extremely uniform and pourable at room temperature, with no need for sophisticated dosing equipment.
4. The alpha acids content is within a tight range, targeted at 65%.
5. Shipping, storage weight and volume are substantially reduced as only the hop's extracted material is retained and packaged (typically less than 20-25% of the original hop material for high-alpha hops).

One caveat to the above statement: Brewers who use a high volume of hops in their process for beer styles with very high bitterness must be cognizant of the effect of the hop vegetative material on beer flavor. There are various water-soluble components from hop vegetative material that, at high-dosage rates, can contribute additional flavors and mouthfeel effects to the beer. Therefore, when transitioning to FLEX, it is essential that brewers conduct trials to ensure the desirable beer flavor profile be achieved.

Contact your Barth-Haas sales or technical representative to get recommendations for your particular circumstance and the goals you want to achieve.

RECOMMENDED TEMPERATURE RANGE FOR TRANSPORT AND STORAGE:

FLEX is most stable when stored at refrigerated temperatures and its packaging remains intact – the colder the storage temperature the better its longevity. However, FLEX tolerates warmer temperatures, e.g. above 25 deg C. for short periods of time, as when staging the product in the brewhouse for a couple of days prior to dosing.

BEST-BY DATES

The best-by date is defined as the date until which that product should perform as expected without concern for product quality, if stored according to recommendations. When FLEX is stored under refrigeration, the product's best-by date is two years from the production date.

The best-by date is not an expiration date, and the product may be perfectly suitable for use past the best-by designation. It is merely the date at which the normal degradation of the components in the product may affect the bitterness potential and physical stability of the product. For many months beyond the best-by date, these deficiencies, if they occur, can be overcome with adjustments to the dosing rate for any diminished bitterness potential.

In addition, product that has been stored past the best-by date can show changes in its aroma profile due to oxidation reactions. Minor oxidation effects are of little or no consequence if the FLEX is used as recommended – exclusively for beer bittering (added early in kettle boil).

If questions arise regarding the suitability of FLEX, whether related in regard to temperature extremes or best-by designation, please contact your BHG sales and/or technical representative.



USE OF FLEX

Designed for bittering, FLEX should be dosed into the brewkettle near the beginning of boil, much as is done with whole hops and hop pellets. Unlike whole hops and hop pellets, FLEX disperses much more readily and provides a 10 – 20% (relative) increase in alpha acids utilization as compared to standard T90 hop pellets. In a typical lager brewing process, the upper limit of alpha acids utilization is about 35% (FLEX to finished beer); hop pellets max out at about 30%

FLEX contains about 65% alpha acids, thereby providing a five-fold reduction in product weight than the pellet dosing equivalent, and an even more significant reduction in volume. As with whole hops and hop pellets, FLEX should be dosed according to its alpha acids content to achieve the desired bitterness in the beer.

PACKAGE SIZES AND TYPES

FLEX is currently available in convenient 1 kg, 2 kg and 10 kg packages. These packages are re-sealable and recyclable. Larger packaging sizes may become available depending on demand.



TYPICAL ALPHA ACIDS UTILIZATION RANGES FOR HOP PRODUCTS

Whole Hops	15 – 25%
T90 Pellets	20 – 30%
FLEX®	25 – 35%



DOSING PROCEDURES

This is where FLEX really shines—its ease of use. If the product has been stored cold, it should be brought to room temperature or above, either by briefly storing at room temperature until attemperated or by gently heating the product if used within a short period. To ensure homogeneity, mix the product by repeatedly inverting the package a few times prior to dosing. Typically, dosing calculations for FLEX will give values for the weight of the product to be added, e.g. grams per barrel, but the density of FLEX is close to 1 gram per milliliter, and as such, the product can be measured by volume in a beaker or other volumetric measuring vessel.

Residual FLEX will cling to the interior surface of the dosing vessel. This can be easily rinsed into the kettle by use of a laboratory squirt-bottle filled with a 50:50 ethanol/water solution (Everclear® grain alcohol works well for this).



DOSING CALCULATIONS

Conditions in different breweries vary so widely that no single formula is adequate for all breweries. From information provided by the brewer on hopping rate, type of hops used and hop boiling schedule, a recommended initial dosage rate will be provided by Haas sales/technical personnel.

When replacing hop pellets with FLEX for initial trials, we recommend that the alpha acids kettle dosage be reduced by 10 to 20%.

The basic calculation for hop dosing:

$$\text{Kg product to dose} = (\text{hL} \times \text{ppm}) / (\%U \times \%conc)$$

- **hL** = Final beer volume in hectoliters (1 bbl = 1.174 hL)
- **ppm** = ppm iso-alpha acids desired in final beer; roughly relates to bitterness units
- **%U** = Estimated percent utilization = (iso-alpha acids in beer / alpha acids dosed) X 100
- **%conc** = Percent concentration of alpha acids in hop product

Example: 100 bbl finished beer, 40 ppm IAA desired, 30% utilization, 65% alpha acids in FLEX

$$\begin{aligned} & ((100 \times 1.174) \times 40) / (30 \times 65) \\ & = 2.41 \text{ kg FLEX to dose} \end{aligned}$$

FLEX is produced with a target alpha acids concentration of 65%. Standard dosing calculations typically used for alpha-to-beer bitterness levels should be used for FLEX, taking into account differences in utilization and using the alpha-acids content listed in the FLEX certificate of analysis. As a general guideline, using the **65% FLEX** concentration and **30% bitterness utilization**, an initial trial dosage is calculated to be **6.0 grams of FLEX for every 10 BU desired in one barrel of beer** (= 1.174 hL beer). Of course, actual utilization may differ, and adjustments are normally required.



CLEANING AND SANITATION

Because of the tendency for hop acid resins to stick to surfaces and build up, we recommend that periodic cleaning be performed on any permanent dosing system. A cleaning procedure will usually be included in the operating instructions for commercial dosing units, and we recommend that those instructions be meticulously followed. For general periodic cleaning and maintenance, the system can be flushed with a caustic solution at a strength that is typically used for CIP cleaning; this can be performed during the scheduled CIP cleaning of the brew system.

The advantage of smaller, less sophisticated systems is that cleaning is simplified, with no routine cleaning or maintenance required. However, there's always a chance that FLEX will be spilled externally on equipment, flooring, clothing and skin. We recommend that personal protective equipment be worn when handling FLEX, including safety glasses, rubber or plastic disposable gloves, and protective clothing. FLEX is not particularly hazardous but can be an irritant and difficult to clean using traditional soap/detergents and water.

Alcohol solutions such as 50% ethanol, 50% methanol or 70% isopropanol work well for cleaning spills, but be aware that these are volatile solvents and appropriate caution should be taken when handling them. For any cleaning that has exposure to the wort or beer steam, only ethanol should be used as opposed to the other alcohols mentioned. An alternative to ethanol is the use of a dilute potassium hydroxide solution (approximately 0.1 molar) for cleaning equipment. If using a caustic solution, it is important to follow with a generous flush of distilled/deionized water.

FREQUENTLY ASKED QUESTIONS:

What is the best temperature to store FLEX?

FLEX, when stored in its original unopened container, is quite stable. When refrigerated, Barth-Haas gives the product a best-by designation of two years from time of production, but it could be suitable for use well beyond that time. If you have product approaching or beyond the best-by date, Haas can analyze a sample of the product to determine whether any appreciable degradation has occurred. The colder the temperature at which FLEX is stored, the longer its longevity.

How soon should the FLEX be used once the original package is opened?

If stored at ambient or cooler temperature in its original container, the opened product should be used within a few days, or about a month at most. For longer storage, the headspace in the package can be flushed with nitrogen or CO₂ and then resealed.

Can I dose FLEX late in kettle boil or into the whirlpool?

This is not recommended. FLEX is designed only to provide hop bitterness, and therefore the earlier it is added to the kettle, the better its efficiency. For optimum consistency and bitterness utilization, FLEX should be dosed at kettle first-wort or the beginning of boil.