



## Why are we asking for this on your posters?

As engineers, we strive for higher standards and continuous improvement in our profession. Why not strive for the same in our favorite hobby?

Calculating brewhouse efficiency for your brewing setup can help you better utilize ingredient malts and help you nail your target gravity. If taken a few steps further, it can also help you identify specific points of loss within your process.

This year we wanted to introduce a small piece of technical rigor to the posters used in competition. Please be sure to display your calculated brewhouse efficiency on your poster. Please also show your work and be able to walk poster judges through your calculation on competition day. For more info on what we're looking for here please see the poster rubric.

# - How to Calculate Brewhouse Efficiency -

Brewhouse Efficiency is a measure of how efficient your brewing process is at extracting available fermentable sugars from your grain. The calculation is straightforward: divide the amount of sugars you've extracted during your brewing process and divide by the total amount of sugars that were available. To figure out how much available sugar is in the malt your recipe calls for, you can calculate grain points as described below:

## Calculating Grain Points for Your Malts

### Method 1: Extract Dry Basis Fine Grind (DBFG)

Find the DBFG value on the malt manufacturers datasheet (may be listed as Extract %). This number represents the maximum attainable extract potential of this particular malt.

The DBFG percentage is reported in reference to 1lb of sucrose dissolved in water. 1lb of sucrose dissolved in 1 gallon of water yields a specific gravity of 1.046. To convert specific gravity into grain points, you subtract 1 and multiply by 1000 (i.e.  $(1.046-1)*1000 = 46$ ). To calculate grain points for the malt in our recipe, we multiply the DBFG for our particular malt by 46, the grain points for sucrose.

For example, for Breiss Brewer's Malt, the Extract Dry Basis Fine Grind is reported at 81% (per manufacturers datasheet below). For this malt, the grain points would be  $46*0.81 = 37.26$  or 37 Grain Points (round to the nearest whole number).



## PRODUCT INFORMATION SHEET

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All Natural Since 1876 [www.Briess.com](http://www.Briess.com)

### Brewers Malt

#### TYPICAL ANALYSIS - WK

Mealy / Half / Glassy .....	100% / 0% / 0%
Plump .....	80%
Thru .....	2%
Moisture .....	4.2%
Extract FG, Dry Basis .....	81%
Extract CG, Dry Basis .....	80%
Extract FG/CG Difference .....	1.0%
Protein .....	11.5%
S/T .....	42.0
Alpha Amylase .....	65

#### ITEM NUMBER

5298 .....	Whole Kernel, 50-pound bag
5596 .....	Preground, 50-pound bag

#### CERTIFICATION

Kosher: UMK Pareve

#### STORAGE AND SHELF LIFE

Store in a temperate, low humidity, pest free environment at temperatures of <90 °F. Improperly stored malts are prone to loss of freshness and flavor. Whole kernel



## How to use Brewhouse Efficiency to Improve your Brewing Process

For the purposes of the ABBC, we are only looking for an overall brewhouse efficiency (i.e. take a SG reading right before pitching yeast), but you can do this calculation at any stage of the brewing process by taking intermediate SG readings.

Doing these intermediate calculations can help to identify possible sources of loss throughout your brewing process. For example, you can take SG readings after mashing, sparging, whirlpooling, transferring your wort, etc. If you observe substantial changes in SG between steps, you may get a better idea of which operations in your process could benefit from improvement.

Calculating grain points in a new recipe and knowing your brewhouse efficiency can also help you to optimize a recipe for your system.

# - How to Calculate Brewhouse Efficiency -

## Method 2: Potential Starting Gravity

Darker malts and adjuncts will typically impart fewer available sugars, primarily contribute color and different flavors, and are often used in smaller amounts in recipes. In these cases, an Extract DBFG may not be reported by the manufacturer, but you can estimate the potential starting gravity from reference materials such as BeerSmith™ (<http://beersmith.com/grain-list/>). This will report a potential starting gravity (estimating 1lb of malt/adjunct in 1 gallon of water) that you can convert to grain points.

For example, Chocolate Malt is reported as having a potential SG of 1.028. This converts to 28 Grain Points.

## Calculating Grain Points in Your Recipe

Once you have determined the grain points for each of your malts, you can apply this info to your entire recipe. You need to scale the grain points proportionately to the amount of malt in the recipe and batch size. For a Northern English Brown Ale Recipe, you may have the following information:

- Maris Otter = DBFG of 81.5% (37 grain points)
- Carapils = DBFG of 75% (35 grain points)
- Victory malt = DBFG of 75% (35 grain points)
- Caramel 80 malt = DBFG of 76% (35 grain points)
- Brown malt = DBFG 68.7% (32 grain points)
- Chocolate malt = Potential SG 1.028 (28 grain points)
- Special Roast = DBFG 72% (33 grain points)

Multiply the grain points by the number of pounds of that particular malt in the recipe and divide by batch size in gallons. Sum the resulting grain points contributed by each malt.

- Maris Otter:  $(37 * 7 \text{ lbs} / 5 \text{ gallons}) = 51.8$
- Carapils:  $(35 * 1 \text{ lb} / 5 \text{ gallons}) = 7$
- Victory:  $(35 * .75 \text{ lbs} / 5 \text{ gallons}) = 5.25$
- Caramel 80:  $(35 * .5 \text{ lbs} / 5 \text{ gallons}) = 3.5$
- Brown:  $(32 * .5 \text{ lbs} / 5 \text{ gallons}) = 3.2$
- Chocolate:  $(28 * .25 \text{ lbs} / 5 \text{ gallons}) = 1.4$
- Special Roast:  $(33 * .25 \text{ lbs} / 5 \text{ gallons}) = 1.65$

**Total: 73.8 or 74 Grain Points in the recipe** (round to the nearest number)

This number will represent the maximum amount of sugar available to be extracted from the malts in your given recipe.



# - How to Calculate Brewhouse Efficiency -

## Calculating Brewhouse Efficiency

Now that you have calculated the maximum possible grain points from your recipe you can compare that number to the grain points in your wort right before you pitch your yeast. Take a specific gravity reading of your wort before you pitch your yeast. Convert that specific gravity to grain points (subtract 1 and multiply by 1000). Take those grain points and divide by the recipe grain points to get your brewhouse efficiency.

For example, for the Northern English Brown Ale recipe described above, assume you measured a specific gravity of 1.061. Converting this specific gravity to grain points, you would get 61  $((1.061-1)*1000)$ . Brewhouse efficiency would be  $61/74 = 82\%$ .

*This handout was created with the help of the following references. Please feel free to refer to them for further reading!*

<https://learn.kegator.com/brewhouse-efficiency/>

<https://www.homebrewsupply.com/learn/calculate-brewhouse-efficiency.html>

<http://beersmith.com/blog/2014/11/05/brewhouse-efficiency-vs-mash-efficiency-in-all-grain-beer-brewing/>

