

## Belgain Triple

Rev A-0 2-9-16

Rev A-1 08-19-16 (adjust for low DO, add calc for hops)

	Input	Calculated	Measured	Adjustment	Equipment val
<b>Grain</b>	lb.	oz.	%	Cost	Cost Unit Cost Total
Belgain Pilsner Malt		24.5		83.5% \$ 63.86	55.00 \$ 28.44
Melanoidin Malt		0.4375		1.5% \$ 1.94	1.00 \$ 0.85
<b>Total</b>		24.9375			

\*\*\*Recipe Scaling Done in Beer Tools

## Other Fermentable

Table Sugar/Sucrose, 10 min	4.4	15.0%	\$ 1.35	1.00	\$ 5.94
<b>Total</b>	29.3375				

## Recipe Base Hops

Varietal	Target IBU	Alpha Acids	Boil Time (minute Utilization*adap AAU	oz.
<b>Mash</b>				
Hop				
<b>Boil</b>				
German Tettnanger Hops, 60 min	34.3	4.0%	60	26.6% 0.207 5.16
Czech Saaz Hops, 10 min	2	3.2%	10	8.5% 0.037 1.17
Flameout/whirlpool-Hop				0.00% 0.000 0.00
Flameout/whirlpool-Hop				0.00% 0.000 0.00
<b>Dry-Hop</b>				
Dry-Hop				0.00% 0.000 0.00

		ml per 10 IBU per 5					
Adjusted Hops	Target IBU	gallons at PBG	Boil Time	Boil Time Multiplier	ML Required		
Hop-Shot-to-replace-bittering-Hop							
Hop-Shot-to-replace-bittering-Hop							
Varietal	Target IBU	Alpha Acids	Boil Time (minute	Utilization*adaç	AAU	oz.	
German Tettnanger Hops, 60 min	34.3	4%	60	26.6%	0.207	5.16	
Czech Saaz Hops, 10 min	2	3%	10	8.5%	0.037	1.17	
Flameout/whirlpool-Hop					0.0%	0.000	0.00
Flameout/whirlpool-Hop					0.0%	0.000	0.00
Dry-Hop							
Dry-Hop			n/a	n/a	0.000	0.000	0.00

## Targets

Size (post boil):	12	gal		\$ 48.74	Total Cost
Size (effective total)	10	gal	1280 oz.	\$ 0.04	\$/oz.
Efficiency	93%			\$ 0.61	\$/pint (16oz)
Attenuation	86.00%				
Calories	275	kcal/12oz			
OG	1.0840	1.075-1.085			
Terminal Gravity	1.012	1.008-1.014			
Color	4.7	4.5 - 7.0			
Alcohol	9.5%				
Bitterness	36	20 - 40			

## Notes:

- Add 500mg potassium metabisulphite to 20 gallons water to remove chlorine/chloramine (as required).
- Water treated with brewing salts to: Ca=50, Mg=10, Na=16, Cl=71, SO4=71
- 1.25 qt/lb mash thickness. **Step Mash**
- Start the mash at 131F for 10 mins (protein rest).
- Ramp up to 149F and hold for 90 mins (beta rest).
- Ramp up to 155F and hold for 30 mins (alpha rest).
- Then raise to 168F and hold for 10 mins (mashout).
- 60-90 min fly sparge with ~6 pH water. Collect 14.9 gallons in the boil kettle. (0.2 gallon per min for 75min)
- Boil for 90 minutes. Lid on at flameout with 0 minute hops, start chilling immediately.
- Cool wort to 64F
- Allow temp to raise 1°F per day over one week, continue until finished. Allow to go up to 75°F if necessary to finish.
- Keg and carbonate on the **high** side (around 2.5 to 3.5 volumes of CO2)
- **Keep near freezing for 4 weeks if possible!!!!**



## Calcs

Mash thickness	1.25	qt/lb.
Total Grain	24.9375	lb.
False Bottom Volume	0.22	gal
Liquid in Hoses	0.5	gal
Strike Water Volume	8.51	gal

Boil off rate	1.9	gal/hr
Boil time	1.5	hr
Wort in boil kettle	14.85	gal
liquid lost to grain absorption	2.9925	gal
Sparge water	9.33	gal

OG	1008.000	GU
SG (before sugar)	1.070	
Plato	16.945	
Density	1.068	
Weight of solution	1067.676	gm/L
Weight of original sugar	180.920	gm/L
Weight of Water	886.756	gm/L
Sugar Added	1995.8048	gm
Volume at addition	45.424944	L
Weight of sugar after addition (per l	224.8560321	gm/L
Plato after addition	20.22791583	
SG After Addition	1.084	
Error	0.000000	*use iterative solver to Zero
Gravity Change from Dextose	0.014	
OG Target Gravity Before Sugar	1.070	834.021
Preboil Gravity	1.056	

Salt Additions	Gypsum CaSO4	Calc. Chloride CaCl2	Epsom Salt MgSO4	Magnesium Chld (MgCl2 x 6H2O)	Canning Salt (NaCl)
Mash Water Additions (grams):add at dough-in or prior.	0.60	2.52	0.97	0.00	0.00
Sparge Water Additions (grams):add to boil,	0.66	2.76	1.06	0.00	0.00

SMB Dosage mg/l	Sparge	SMG to add grams
Mash		Mash Sparge
25.0	5	0.2810 0.08

Lactic Acid ML	Sparge
Mash	
6.25	1.44

Step/PID	Completed	Procedure
1		Condition grain at 1.5% Water By weight (0.3740625lb Water)
		Mill Grain at about 2-4 RPS with grain rollers set 0.045" gap
2		Close all valves
3		Fill the HLT with minimum of 12 gallons of water
		Fill the Boil Kettle with Strike water
4		Boil strike water for 5 minutes, add SMB + salts, wait 5 minutes
5		Rapidly cool Strike water to 152°F using the HERMS Coil
		Start to Reserc water in HLT
		Raise HLT water to 152°F (approx. 40-60 minutes)
		Do not let the HLT water hit target before the strike water is lowered in temp or HLT will need partial drain and cool water added
6		Stir minimally for a few minutes with paddle. Ensure all grain is wet and there are no clumps
		Add calculated Lactive Acid to Mash, if required
		Once well mixed take a PH reading. Target is 5.2 to 5.4 (relative to mash temperature)
		Add Lactive acid 88%, 1/2ml at a time stir and remeasure if required
		Place hose back in, close lid, turn wort pump on.
		<b>Mash Hops if required</b>
		<b>Start the mash at 131F for 10 mins (protein rest).</b>
		<b>Ramp up to 149F and hold for 90 mins (beta rest).</b>
		<b>Ramp up to 155F and hold for 30 mins (alpha rest).</b>
		<b>Then raise to 168F and hold for 10 mins (mashout).</b>
7		Mash for 90 min
8		Boil HLT water for 5 minutes, then add SMB and hold 5 minutes
		TURN HEATING ELEMENT OFF
		Increase temp to 168°F (about 20 min) and hold 10 minutes
		Rapidly chill HLT to 168°F
		Acidify Sparge Water with Lactic Acid as required
		Remove a sample of water from HLT, allow to cool to below 140°F
		Measure Ph of cooled HLT water. Adjust with Lactive acid to 5.6 to 5.8
9		Turn Pumps off
		connect hoses. HLT out to (pump) to HERMS in, HERMS out to MLT in, MLT out to (pump) to BK
		Install Mash Cap
10		Turn pumps on
		open valves for transfer rate of approx. 0.2 gpm, keep 1-2 inches a 74.25 minutes
		Once the heating element is submerged completely, turn on element to preheat
		Add Boil Salts
11		Turn of water pump when HLT is empty
12		Turn off wort pump when target preboil volume is reached
		take Mash PH and gravity readings
		measure Ph of wort, if above 5 - 5.5 (relative to temp) adjust
13		Boil wort (approx. 30-45min)
		stir as necessary to prevent boil over
14		once boiling reduce duty cycle to ~75-85%
		clean MLT
		Sanitize
15		Boil for 90 Min
		<b>German Tettnanger Hops, 60 min</b>
16		Run Sanitizer through hx, 30 min
17		Connect pumps and hx in series to sanitize, 15 min
		<b>Czech Saaz Hops, 10 min</b>
		<b>Sugar, 10 min</b>
		Turn off element@ 0 min
18		Chill to 64°F-66°F (~20min) OR AS CLOSE AS POSSIBLE, whirl pooling
		measure Ph of chilled wort, target 5-5.5 <b>DO NOT ADJUST</b>
		Measure the post boil gravity
		Let rest for 15 minutes after whirlpool
19		Transfer to Fermenter
20		Connect Fermenter cooling glycol, heater and temperature probe
		Program the BCS to the correct fermentation temperature and activate program (be sure to active program to resume on power failure)
		Cool the rest of the way as necessary
		pitch yeast
		Oxygenate
		Install blow off tubing into sanitizer *****alt use spudding valves set to less than 3psig
		<b>Aerate again ~12 hours, if necessary</b>
		<b>At this point closed system</b>
		Ferment per program
		ferment until SG is stable over several days (2-3 weeks)
		switch blow off tube for positive pressure CO2, active purge while dry hopping
		<b>Dry Hop</b>
		Cold crash
		let clear 3-4 days

Description	Expected	Measured	Adjustment	Post-AdjMeasured
Pre mash pH	5.2 - 5.4			
Post Mash pH	5.6 - 5.8			
Boil Kettle pH (after salt additions)	5-5.5			
OG Target Gravity Before Sugar	1.06950178			
Boil time	90 min			
OG	1.084			
Chilled Wort pH	5 - 5.5		-	
Efficiency	93%			
Terminal Gravity	1.012		-	-
Attenuation	86%		-	-
Alcohol	9.5%		-	-

Date						
Gravity						
Dry Hop						
Cold Crash						