1 GAL MOONZEN THUNDERGOD PALE ALE

BREW NOW. DRINK LATER.

ABV/ 5%

Grain Bill

Pale Malt 2-row	1.75 lb (794g)
Caramel 20L	5.5 oz (156g)
Dextrine Malt	1.0 oz (28 g)
White Wheat Malt	1.0 oz (28 g)

Hops

1st addition – Magnum AA 12.4%	0.1 oz (2.8g)
2nd addition – Citra AA14.1%	0.45 oz (13 g)
3rd addition – Citra AA14.1%	0.45 oz (13 g)
Dry Hop – Citra AA14.1%	0.45 oz (13 g)

Store in freezer if you're not brewing soon.

Yeast

U.S. Dry Ale Yeast	0.1 oz (2.8 g)

Store in freezer if you're not brewing soon.

Priming Agent (For Carbonation)

Corn Sugar (Dextrose)

Use a priming sugar calculator to calculate how much you need. See Step 6.

EQUIPMENT NOT INCLUDED IN THE KIT

- A stove (gas /electric)
- A fine sieve
- A plastic funnel
- A scale (0.1-1.0g resolution)
- A ladle (at least 12 inches long)
- ONE cooking pot that holds at least 2.5 Gal (9.5 L) liquid
- Ice

INGREDIENTS NOT INCLUDED IN THE KIT

- N/A

ITEMS TO CLEAN & SANITIZE ON BREW DAY

- Carboy
- Hydrometer
- Sample jar for the hydrometer (or the plastic tube that came with it)
- Sieve
- Funnel
- Air-lock adaptor / stopper
- Siphon hose
- Your hands!

MASH OUT [OPTIONAL]

- After mashing for 60 min, raise the temperature of the wort to 168° F (75° C) - 170° F (75° C) while stirring then turn off the heat to let it rest for 10 min.

HYDROMETER

- The hydrometer reads the gravity (i.e., density) of the wort in relation to water. Place the hydrometer into the sample jar and fill it up with the sample solution until the hydrometer floats. You want to read where the mark on the hydrometer touches the surface of the sample solution. If your sample is water, it will read 1.000. If there is sugar dissolved in the wort, the reading will increase from 1.000 to a higher number.
- When reading gravity, make sure to wait until the sample's temperature (the sample only, don't chill the whole pot of wort) drops to 60° F (16° C) – 68° F (20° C) as most hydrometers are calibrated to this temperature. The calibration from 150 °F (66 °C) - 155 °F (68 °C) to 60° F (16° C) – 68° F (20° C) is normally +0.016. For example, a reading of 1.020 at 150 °F (66 °C) will be 1.036 at 60° F (16° C).

TARGET PRE-BOIL GRAVITY

- This is the gravity reading of the wort prior to the boil.
- The target **Pre-Boil Gravity** for this recipe should be **1.020 – 1.030**.

30min

1. PREPARATION

- See sections "Equipment not Included in the Kit" and "Ingredients not Included in the Kit", and prepare the items ahead of time.
- Prepare items in "Items to Clean & Sanitize on Brew Day" section. Clean the equipment with kitchen soap, rinse well with tap water, and then sanitize. To sanitize the equipment, mix **5ml** of IO-Star / Star-San with **1 Gal (3.8 L)** of tap water to create the sanitation solution and let equipment to soak for at least **1 min**. Set aside the equipment and air-dry after soaking.

60min

2. MASH – BREW IN THE BAG ("BIAG") METHOD

- Boil **1.8 Gal (6.8 L)** of water in the cooking pot for 15 min then turn off the heat to let it cool down to **160° F (71° C)**.
- Put the grain bag into the cooking pot. Line the cooking pot with the grain bag with the opening facing up. Pour the malt into the grain bag slowly while stirring with the ladle. Break up any clumps until the sugary liquid (the "wort") resembles a porridge. Use the floating thermometer to measure the temperature for **1 min**. The temperature should drop to **150° F (66° C) – 155° F (68° C)**.
- Cover the pot and let the malt mash for **60 min** at **150° F (66° C) – 155° F (68° C)**. Check the temperature and stir the malt every **30 min**. If the temperature drops out of range, reheat the wort to **150° F (66° C) – 155° F (68° C)** while stirring.

30min

3. SPARGE – BIAG METHOD

- Lift the grain bag out of the pot and strain it with a sieve over a separate bowl for **30 min**. Do not squeeze the grain bag. Collect the wort from that separate bowl and add it back to the wort during the boil.
- Use the hydrometer and sample jar to measure the "Pre-boil Gravity".
- If you notice that you are falling short of the target Pre-boil Gravity, you can consider raising the wort temperature to **168° F (76° C)** then strain the wort through the sieve into the separate bowl and recirculate the wort through the malt a couple times to increase the gravity.

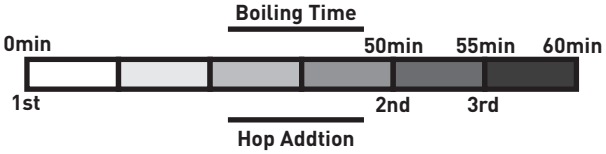
HK BREWCRAFT

BREW NOW. DRINK LATER.

60min

4. BOIL

- Discard the malt then bring the wort to a boil. When the wort starts to foam up (the "hot break"), reduce the heat to a rolling boil. The total boiling time is **60 min**:
- **1st** addition **Magnum 0.1oz (2.8g)** at the **beginning**.
- **2nd** addition **Citra 0.45oz(13g)** at the **50 min** mark.
- **3rd** addition **Citra 0.45oz(13g)** at the **55 min** mark.
- Turn off the heat at the **60 min** mark.
- Use the sanitized ladle to create a whirlpool in the wort (avoid splashes) and place the pot in an ice water bath to rapidly chill the wort to below **80° F (26° C)**.



Day 1

5. FERMENTATION

- Pour the chilled wort into the sanitized carboy using the sanitized sieve and funnel. Fill wort up to the "ONE GALLON" mark of the carboy and avoid the sediments at the bottom of the pot.
- Measure the original gravity ("OG") and add pre-boiled water to the carboy to adjust the OG, if needed.
- Aerate the wort by shaking the carboy vigorously. Sanitize your hand if you use it to cover the mouth of the carboy when shaking.
- Pitch **0.1 oz (2.8 g)** of yeast to the wort then install the sanitized air-lock adaptor / stopper onto the mouth of the carboy.
- Blow-off tube set-up **(Day 1 – Day 3)** - Insert one end of the sanitized hose into the air-lock adaptor / stopper and the other end into a water bath.

Day 4

- Air-lock set-up **(Day 4 – Day 14)** - replace the blow-off hose with the sanitized air-lock on **Day 4** and keep it on until fermentation is complete.

Day 14

- During the **14 days** of fermentation, keep the carboy in a water bath away from sunlight and at a temperature between **59° F (15° C) – 75°F (24° C)**.
- After 14 days, if the gravity is within the final gravity ("FG") range and the reading has not changed for few days, the beer is ready to be bottled.

Day 14

6. BOTTLING

- If you want a clearer beer, take out the air-lock, cover the carboy mouth with plastic wrap, then chill the carboy of beer in the refrigerator / an ice bath for at least **12 hours** prior to bottling.
- Use an online priming sugar calculator to calculate the amount of corn sugar to add. Input (1) the current beer volume (use a rule to visually estimate in relation to the ONE GALLON mark on the carboy), (2) the desired CO2 volume **[2.4]** (do not exceed **2.8** to avoid explosion), and (3) the beer temperature.
- Bring **¼ cup (60 ml)** of water to boil, turn off the heat, then add the priming sugar. Mix well and let the syrup sit for **5 min** to cool down. Add the cooled syrup to the carboy of beer, gently mix it with the sanitized auto-siphon and allow it to sit for **5 min**. Try not to disturb the trub at the bottom.
- Connect the sanitized bottle filler and auto-siphon to both ends of the sanitized siphon hose.
- Gently dip the auto-siphon into the carboy of beer, while placing the bottle filler into a bottle. Press the spring-tip of the bottle filler against the bottom of the bottle and give the auto-siphon a gentle pump to start the beer flow.
- Fill the bottles up to two inches from the top of the bottle.
- Cap your bottles with sanitized bottle caps / snap on the sanitized flip tops.
- Keep the bottles in a cardboard box and place it in safe place away from sunlight for 14 days at a temperature between **59° F (15° C) – 75°F (24° C)**.

Day 28

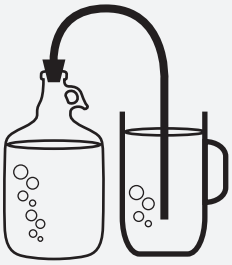
- Refrigerate upright before drinking and avoid chilling in a freezer.

IRISH MOSS [OPTIONAL]

- Add Irish Moss 10 min before the end of the boil to enhance clarity of your beer. Stir well after adding Irish Moss.

TARGET ORIGINAL GRAVITY

- **OG** is the gravity reading of the wort prior to fermentation.
- The target **OG** for this style is **1.045 – 1.060**. If the OG is too high, you can dilute the wort with cool pre-boiled water.



BLOW-OFF TUBE SET-UP Day 1 – Day 3

AIR-LOCK SET-UP Day 4 – Day 14

DRY HOPPING

- If the recipe requires dry hopping, add the hops into the carboy after **9 days** of fermentation and remember to put the air-lock adaptor / stopper with the air-lock back on. Let the hops soak in the carboy for **5 more days** then proceed to bottling.

TARGET FINAL GRAVITY

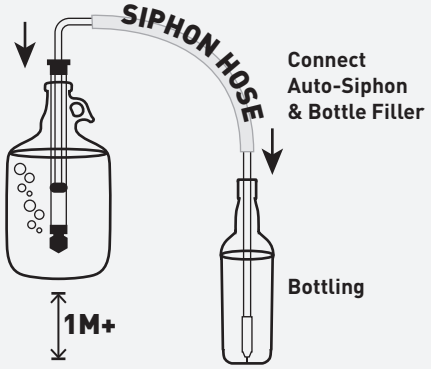
- **FG** is the gravity reading after fermentation.
- The target **FG** for this style is **1.010 – 1.015**.

ITEMS TO CLEAN & SANITIZE ON BOTTLING DAY

- Bottles and flip-tops / bottle caps
- Siphon hose
- Auto-siphon
- Bottle filler

PRIMING SUGAR CALCULATOR

- http://www.brewersfriend.com/beer-priming-calculator/



WARNING!

- **WARM TEMPERATURE, OVER PRIMING, OR CONTAMINATION MAY CAUSE OVER CARBONATION AND EXPLOSION OF GLASS BOTTLES. PLEASE KEEP THE GLASS BOTTLES IN SAFELY SEALED BOXES, AND AWAY FROM HUMANS AND ANIMALS!**