ABI Brewery Set-up Requirements

Here's a clean, professional, **foundational layout for a microbrewery/distillery**, covering:

1. Facility layout
2. Water quality fundamentals
3. Basic Brewing process
4. Stainless steel & copper cleaning chemistry
5. CIP (Clean-In-Place) product list
6. Passivation & kettle-care considerations
7. Cleaning Chemistry through the Brewing Stages
8. ABI Brewery Chemistry Application
9. Summary

Microbrewery / Distillery – Basic Facility & Process Layout

1. Facility Layout Overview

A small-to-mid-scale microbrewery typically includes:

A. Hot Side (Brew house)
- Hot Liquor Tank (HLT) – heats brewing water
- Mash Tun – grain + hot water conversion
- Lauter Tun – wort separation
- Kettle / Copper Pot – boiling, hop additions
- Whirlpool – trub separation

B. Cold Side (Fermentation & Conditioning)
- Fermenters (Unitanks or Cylindroconical)
- Brite Beer Tank (BBT)
- Cold storage/conditioning room

C. Packaging
- Kegging line
- Bottling/canning line
- CO_2 supply

D. Utilities & Support
- Water treatment system
- CIP station
- Chemical storage
- Yeast propagation area
- Grain milling & storage
- Wastewater management

2. Water Quality – The Foundation of Beer Flavour

Water is the largest ingredient in beer and determines:
- Mash pH
- Enzyme activity
- Hop bitterness expression

- Mouthfeel
- Mineral profile (Ca^{2+}, Mg^{2+}, SO_4^{2-}, Cl^-, HCO_3^-)
- Final flavor balance

Key Water Parameters

- Hardness: 50–150 ppm Ca^{2+} ideal for most styles
- Alkalinity: Controls mash pH; too high causes dull flavors
- Chlorine/Chloramine: Must be removed (carbon filtration or Campden tablets)
- Iron & Manganese: Must be near zero (metallic off-flavors)
- Microbial load: Must be controlled

Why It Matters

Different beer styles evolved around regional water chemistry:

- **Burton-on-Trent:** sulfate-rich → crisp pale ales
- **Pilsen:** soft water → delicate lagers
- **Dublin:** alkaline → dark stouts

A microbrewery should start with **RO water + mineral build-back** for consistency.

3. Basic Beer-Making Process (Simplified)

- Prepare and Treat Brewing Water *Start Here*

  Water chemistry is adjusted before any grain is added.

  - Filter incoming water (carbon + sediment)
  - Adjust minerals for target beer style
  - Heat water in the Hot Liquor Tank (HLT)

- Mash in the Grains

  Hot water activates enzymes that convert starches into fermentable sugars.

  - Add crushed malt to mash tun
  - Maintain mash temperature (typically 64–68°C)
  - Hold for 45–60 minutes
  -

- Lauter and Sparge

  Sweet wort is separated from the grain bed.

  - Recirculate wort until clear
  - Rinse grains with hot water (sparging)
  - Transfer wort to kettle

- Boil and Add Hops

  Boiling sterilizes wort and extracts hop bitterness and aroma.

- Boil 60–90 minutes
- Add hops at scheduled intervals
- Add clarifiers if needed

- Whirlpool and Cool

  Trub is separated and wort is cooled for fermentation.

  - Create whirlpool to settle solids
  - Cool wort to 18–22°C (ales) or 8–12°C (lagers)
  - Oxygenate wort before pitching yeast
  -

- Ferment and Condition

  Yeast converts sugars into alcohol, CO_2, and flavor compounds.

  - Ferment 5–14 days depending on style
  - Cold crash to clarify
  - Transfer to brite tank for conditioning

- Package and Store

  Finished beer is carbonated and packaged for distribution.

  - Carbonate in BBT or via bottle conditioning
  - Fill kegs, bottles, or cans
  - Store cold to preserve freshness
  -

4. Cleaning & Sanitation Chemistry (CIP)

Clean-In-Place is essential for:

- Stainless steel integrity
- Copper kettle longevity
- Flavor consistency
- Microbial control

A. CIP Cleaning Products (Typical List)

1. Caustic Cleaners (Alkaline)

Used for: organic soils, proteins, hop resins Examples:

Sodium hydroxide (NaOH) 1–2%
Potassium hydroxide (KOH) blends
Additives: surfactants, chelators, antifoam

2. Acid Cleaners

Used for: beerstone, mineral scale, stainless passivation
Examples:

- **Nitric/phosphoric blends**
- **Citric acid** (mild)
- **Peracetic acid (PAA)** for sanitizing
-

3. Sanitizers

Used before packaging or cold-side contact
Examples:

- Peracetic acid (PAA)
- Iodophor
- Chlorine dioxide

4. Passivation Agents

For stainless steel:

Nitric acid
Citric acid

For copper kettles:
Mild acids only (citric), avoid strong oxidizers

5. Stainless Steel Passivation
Purpose:

- Remove free iron
- Restore chromium oxide protective layer
- Prevent corrosion & off-flavors

Procedure (General)
Clean with alkaline detergent
Rinse

Passivation Process
Apply 20–30% nitric or 4–10% citric
Hold 30–60 minutes
Rinse thoroughly
Air dry to allow oxide layer to form

6. Copper Kettle Care
Copper is reactive and requires gentler chemistry.

Do Use
Citric acid
Mild alkaline cleaners
Soft brushes

Avoid
Strong caustics
Chlorides
Peracetic acid on hot copper
Abrasive pads

Why
Copper contributes beneficial ions to wort but must not leach excessively or corrode.

7. Cleaning Chemistry through the Brewing Stages

Hot Side (Pre-Fermentation)

- High heat reduces microbial risk
- Focus on removing organic soils
- Use caustic + surfactant
- Follow with acid rinse to remove scale

Cold Side (Post-Boil)

- Highest microbial sensitivity
- Use PAA or iodophor
- Avoid residues that affect yeast

Packaging Line

- Biofilm risk is highest
- Use alternating caustic / acid cycles
- Sanitize with PAA before filling

8. ABI Brewery Chemistry Application

A. Alkaline Cleaners (Caustic / High pH)

Used for: Organic soils, proteins, hop resins, brew house cleaning

- **BREWMASTER ALKALI CIP or Spotless™ PBW**
  - Designed for breweries
  - Phosphate free
  - Biodegradable
  - Low foaming
  - Essentially odourless
  - Includes chelation package

- **Purple Beer Line Cleaner**
  - Cleans and sanitizes in one action
  - Leaves no aftertaste
  - Colour indicator: Green = Dirty, Purple = clean

- **Caustic Soda 50% FCC Grade**
- **Caustic Soda Beads**
- **Sodium Metasilicate Pentahydrate**
- **Soda Ash (Light & Dense)**

B. Acid Cleaners (Low pH / Scale Removal)

Used for: Beerstone, mineral scale, stainless passivation, copper-safe cleaning

- **Spotless™ CitraPass SS**
  - Dual-purpose CIP acid cleaner + stainless steel passivation agent
  - Citric-based, low-hazard alternative to nitric acid
  - Excellent for beerstone removal and free-iron removal
  - Superior rinsability and safer handling
  - Designed specifically for brewery stainless tanks
  - Chelates iron without attacking chromium/nickel
  - Environmentally friendlier chemistry

- **Brewery Acid 5**
- **Phosphoric Acid 75%**
- **Citric Acid (Food Grade)**

C. Sanitizers (Cold-Side & Packaging)

Used for: Fermenters, BBT, packaging lines, yeast handling

- **Spotless™ Sanitize [Peracetic Acid (PAA) blends]**
- **Iodophor** (if used in your SOP)
- **Chlorine Dioxide** (optional for some breweries)

D. Solvents / General Cleaning

- **Isopropyl Alcohol 70% USP**
- **Isopropyl Alcohol 99% USP**

E. Personnel Hygiene

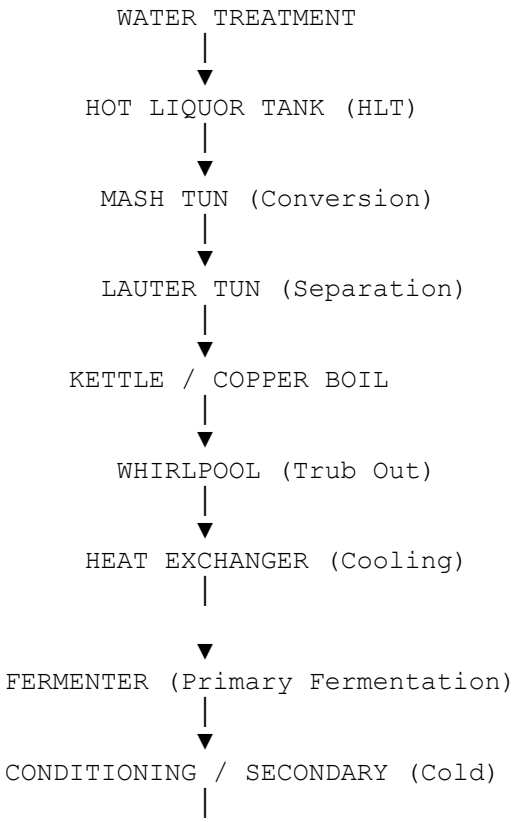
- **Sanitizer Gel**

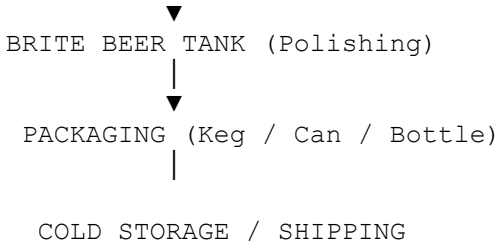
Updated CIP Matrix

Equipment / Area	Soil Type	Cleaning Step	Chemistry	Notes
Hot Liquor Tank (HLT)	Scale	Caustic → Acid	Caustic Soda → **Spotless™ CitraPass SS**	Excellent for scale removal
Mash Tun	Proteins	Caustic	Caustic + surfactant or **Brewmaster Alkali CIP**	Manual assist often needed

Equipment / Area	Soil Type	Cleaning Step	Chemistry	Notes
Lauter Tun	Grain solids	Caustic	Caustic blends or **Brewmaster Alkali CIP**	Rinse thoroughly
Kettle / Copper Pot	Wort sugars	Mild alkaline → Citric	Low-caustic → Citric	Avoid strong caustic on copper
Whirlpool	Hop oils	Caustic → Acid	Caustic → **CitraPass SS**	Removes beerstone effectively
Heat Exchanger (HX)	Organic + mineral	Caustic → Acid	Caustic → **CitraPass SS**	Reverse-flow recommended
Fermenters (Unitanks)	Yeast film	Caustic → Acid → Sanitizer	Caustic → **CitraPass SS** → PAA	Cold-side sanitation critical
Brite Beer Tank (BBT)	Yeast film	Caustic → Sanitizer	Caustic → PAA	Acid cycle optional
Kegs	Biofilm	Caustic → Acid → Sanitizer	Caustic → **CitraPass SS** → PAA	Automated keg washers ideal
Packaging Line & beer pumps	Biofilm	Caustic / Acid	Caustic + **CitraPass SS** + PAA or **Purple Beer line cleaner**	High sanitation requirement

Brewery Process Flow Diagram (Clean & Professional)





9. Summary

A microbrewery's success depends on:

- Water quality as the foundation of flavor
- Proper brew house layout for efficient flow
- Consistent brewing steps
- Rigorous cleaning & sanitation
- Correct stainless and copper care