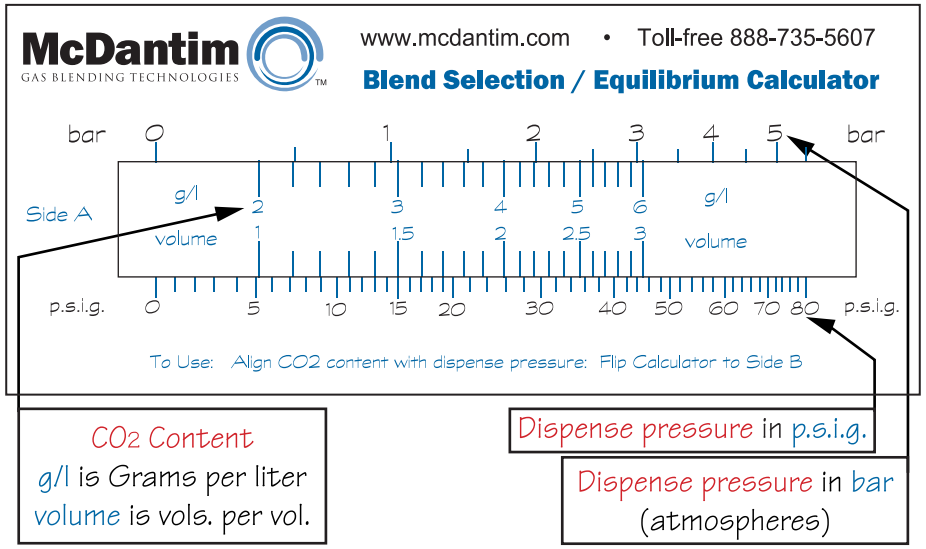
Figure "A" (side A)

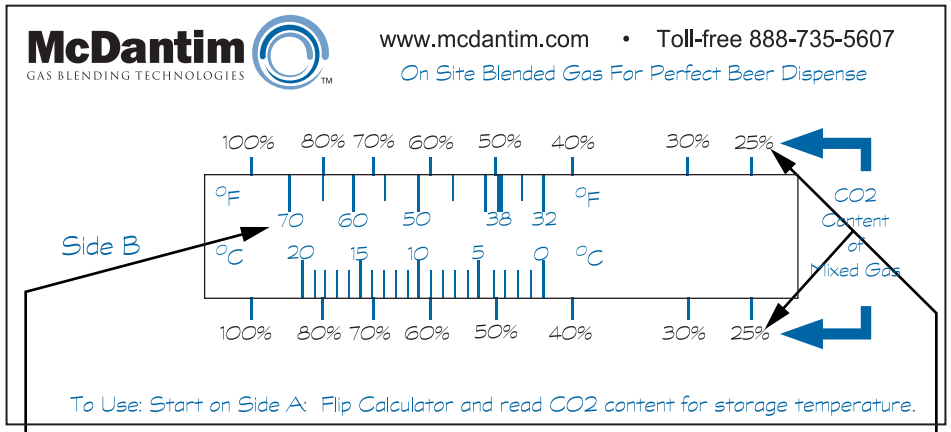


CO2 Content
g/l is Grams per liter
volume is vols. per vol.

Dispense pressure in p.s.i.g.

Dispense pressure in bar
(atmospheres)

Figure "B" (side B)



Storage Temperature
°F is degrees Fahrenheit
°C is degrees Centigrade

Percent CO2 in the blend

We hope you find this to be a helpful explanation and tool. If you have more questions, we have more information available in different forms. We also love to sell our blenders and answer questions. Please call if you have any questions or suggestions or if we can help in any way.

McDantim
GAS BLENDING TECHNOLOGIES

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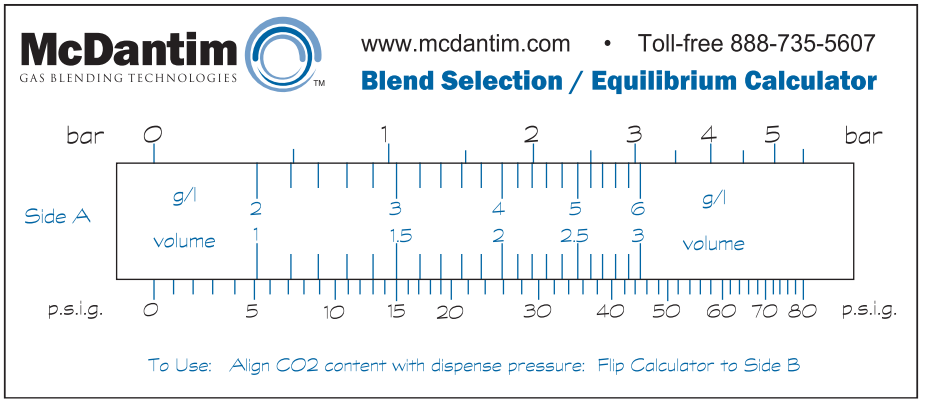
Choosing the Right Blend

and

Using the McDantim Slide Rule



Choosing the right gas or blend of gases is essential to beer quality. Too much CO2 causes the beer to over-carbonate and be foamy. Too little CO2 and the beer goes flat. The McDantim slide rule is a tool to help you choose the correct blend. We will generally discuss the CO2 in the mix and assume that the other gas will be Nitrogen. The only other gas commonly used for beer dispense is air. Air is a very poor choice for dispensing beer as it contains 21% Oxygen, which quickly destroys beer flavors.

Several facts that are needed in order to correctly choose a blend:

- The CO2 content of the beer(s) to be dispensed
- The storage temperature of the beer(s)
- The dispense pressure of the beer(s)

Armed with these facts and a slide rule you can always choose the correct blend.

CO2 Content

The only way to know the CO2 content for sure is to check with the brewery. However, it is possible to make an accurate educated guess. Most lagers are in the range of 2.6 to 2.8 vols. of CO2. Most Micros are in the range of 2.3 to 2.5 vols. Micro stouts and porters can go as low as 2.0 vols. Imported beers can run quite a range, with most lagers in the 2.6 to 2.8 vols. range and most ales in the 2.3 to 2.5 vols. range.

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The notable exceptions are the nitrogenated beers. These include Guinness Stout and several other imported and micro stouts and ales like Boddingtons, Abbots or Pyramid DPA. Most of these beers fall into a range from 1.2 vols. (Guinness) to 1.8 vols. (micro nitrogenated ales).

In table form it would look like this:

- 2.5 to 2.8 vols. - Most lagers - domestic, import or micro.
- 2.3 to 2.5 vols. - Most ales - import or micro.
- 2.0 to 2.3 vols. - Most micro stouts and porters.
- 1.2 to 1.8 vols. - Most nitrogenated ales and stouts.

When there is any doubt contact the distributor or the brewery.

A note about nitrogenated beers

Any beer can be nitrogenated regardless of CO2 content. The higher the CO2 content the lower the N2 content should be. Only nitrogenated beers that are low in CO2 (less than 2.0 vols.) content should be dispensed through a "stout" (agitating) faucet. When higher CO2 content beers are nitrogenated the appearance and retention of the head will be improved but these beers should be dispensed through a standard faucet. When choosing a blend for nitrogenated beers, always choose a blend that maintains the beer's CO2 content. The draft system and faucet combination should allow a pressure high enough to keep N2 in solution as well. For example, Guinness Stout (1.2 vols.) nearly always uses a 25% CO2 blend and is typically stored at 38^{0} F and dispensed at 30 to 35 psig. This keeps both the CO2 and the N2 in equilibrium.

The Blend

How many blends? In almost all cases, you will be choosing a blend to suit a variety of beers. In England, they have such a wide selection of varying CO2 content beers that three blends in a single bar is becoming common. Here in the US, we can nearly always get by with one or two blends. Two blends are suggested if either of two conditions exist: The first is when there is one or more low CO2, nitrogenated beers (Guinness, etc.) along with normally carbonated beers. The second is when the facility has two drastically different dispense situations. An example would be two bars served from one cooler with significantly different dispense pressures, say 20 and 28 psig.

It is becoming very common in the US to run all beers on a single blend, usually 25% or 30% CO2. These blends are commonly available in high pressure cylinders and are called "beer gas", "Aligal", "Guinness gas" or "G mix". We have a number of customers and distributors who only order 25% CO2 mix blenders for all beers. While this is arguably better than overcarbonating all your beers on pure CO2 at too high a pressure, it will cause beer to go flat, lose flavor and be wasted. Premixed cylinders are of a 25% to 30% CO2 mix simply because it is more economical, not because it is the correct blend for most beers.

In a system that has either two or more very different dispense situations, or has both nitrogenated and normally carbonated beers, use two or more blends. The quality and cost savings will more than justify it.

Choosing the blend In most cases, if there is a nitrogenated product choose a 25% blend for that group of beers. For the group of normally carbonated products use the one with the lowest CO2 content for your calculations. An example would be a bar with 10 beers on tap, including Guinness Stout, several domestic lagers, imported lagers, imported ales and micro ales. They store their beer at 38^{0} F, dispense Guinness at 32 psig and all other beers at between 20 and 22 psig. The correct blend choice would be 25% CO2 for Guinness and 60% CO2 for the rest of the beers. If there were no nitrogenated beers in the selection, a single blend of 60% would be correct.

Using the slide rule (Blend Selection / Equilibrium Calculator)

For Blend Selection:

Step 1: (See figure "A" on page 4) Start on side "A" and match up the CO2 content of the beer (either in grams / liter or vols. / vols.) with the dispense pressure (either in psig or bar).

Step 2: (See figure "B" on page 4) Flip the slide rule over to side "B". Find the dispense temperature either in degrees C or F. The correct blend will be the percent CO2 reading that matches the dispense temperature.

Fahrenheit to Centigrade conversion: On side "B": Read up or down from ^{0}C to ^{0}F or from ^{0}F to ^{0}C.

Vols./vol. to g/l conversion: On side "A": Read up or down from g/l to vols. or from vols. to g/l.

Balance point calculation: ("Balance point" is the pressure of pure CO2 that will perfectly maintain the CO2 content of a beer at a temperature.) Start on side "B": Set the storage temperature to match 100% CO2. Flip slide rule to side "A": The pressure matching the CO2 content is the "balance point" of that beer.

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