Brew Master 9000 Hardware

Iver Egge
Kristoffer Dalby
Johan Slettvold

Christer Lund
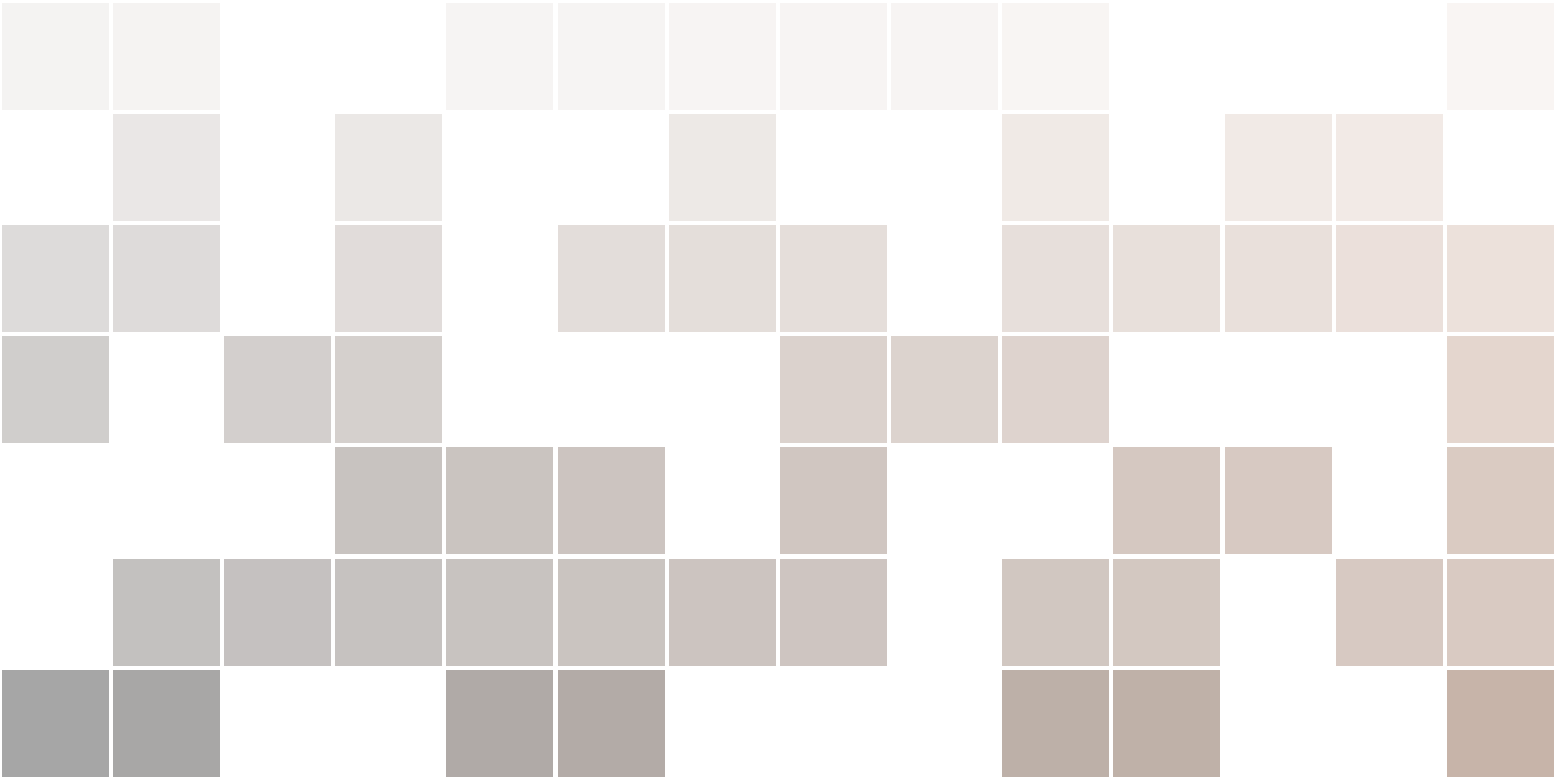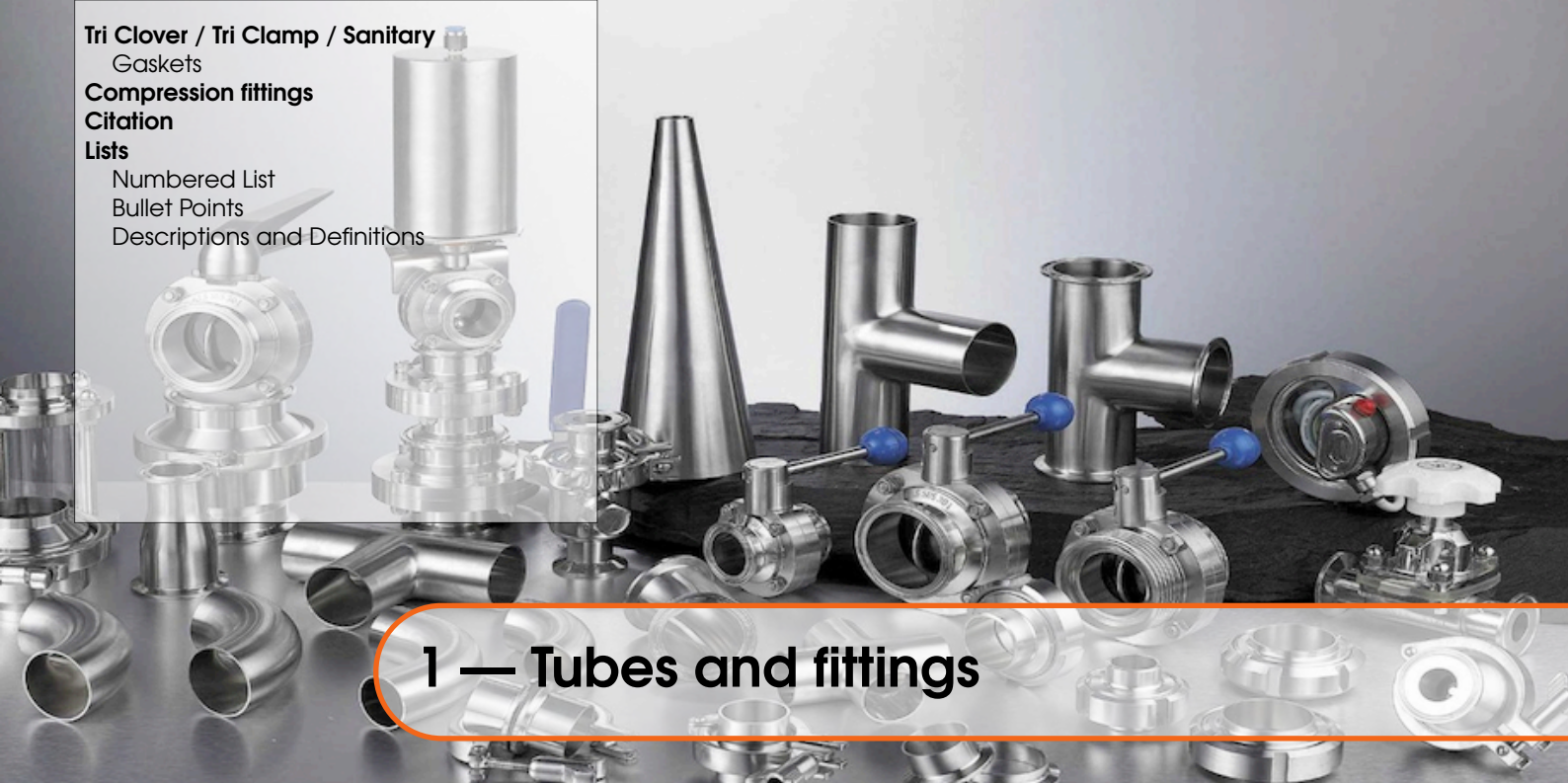
Who needs a license?

First printing, October 2013

Contents

1 — Tubes and fittings

1.1 Tri Clover / Tri Clamp / Sanitary

These fittings are used throughout the brewing system as they provide easy dissassembling and just look really, really cool.

1.1.1 Gaskets

There are many types of gaskets produced for use with tri clamp fittings. Three of these types are commonly used in amateur brewing systems; silocone, EPDM (ethylene propylene diene monomer) rubber and PTFE (polytetrafluoroethylene) teflon.

Silicone

Temperature rating of $-49°C \sim 230°C$.
These are the most common gaskets that are available. They will degrade over time if used with strong acids. As they stick very well to metal and are soft, they provide an excellent seal.

EPDM rubber

Temperature rating of $-34°C \sim 149°C$.
They have better chemical resistance than silicone gaskets and will last longer than silicone gaskets. As the name implies they are made of rubber and are therefor soft and somewhat sticky.

PTFE teflon

Temperature rating of $-73°C \sim 260°C$.
They have the best chemical resistance of all gaskets and will last the longest. They are, however, hard and will need considerably more compression to provide a good seal.

Gaskets with flanges

A normal gasket will fall right of the fitting when loose. If the gasket has a flange that covers the outer part of the fitting it will stay on the fitting when dissassembling (i.e. does not fall into the warm wort).

Stiffness

A stiff gasket that is not sticky will allow you to turn the fitting without dissassembling the entire connection. Stiffer gaskets will need more compression to provide a good seal.

1.2   Compression fittings

Compression fittings consists of a compression nut and ring that slides over the tube and a threaded fitting. If the tube is made of soft metal there should also be a support insert that is inserted into the tube to prevent it from collapsing.

These fittings should not be over tightened as this will ruin the compression ring and therefore the seal.

1.3   Citation

This statement requires citation [**book_key**]; this one is more specific [**article_key**].

1.4   Lists

Lists are useful to present information in a concise and/or ordered way[1].

1.4.1   Numbered List

1. The first item
2. The second item
3. The third item

1.4.2   Bullet Points

- The first item
- The second item
- The third item

1.4.3   Descriptions and Definitions

Name Description
Word Definition
Comment Elaboration

---

[1]Footnote example...

2 — In-text Elements

2.1 Theorems

This is an example of theorems.

2.1.1 Several equations

This is a theorem consisting of several equations.

> **Theorem 2.1.1 — Name of the theorem.** In $E = \mathbb{R}^n$ all norms are equivalent. It has the properties:
>
> $$\big|\,||\mathbf{x}|| - ||\mathbf{y}||\,\big| \leq ||\mathbf{x} - \mathbf{y}|| \tag{2.1}$$
>
> $$||\sum_{i=1}^{n} \mathbf{x}_i|| \leq \sum_{i=1}^{n} ||\mathbf{x}_i|| \quad \text{where } n \text{ is a finite integer} \tag{2.2}$$

2.1.2 Single Line

This is a theorem consisting of just one line.

> **Theorem 2.1.2** A set $\mathscr{D}(G)$ in dense in $L^2(G), |\cdot|_0$.

2.2 Definitions

This is an example of a definition. A definition could be mathematical or it could define a concept.

> **Definition 2.2.1 — Definition name.** Given a vector space E, a norm on E is an application, denoted $||\cdot||$, E in $\mathbb{R}^+ = [0, +\infty[$ such that:
>
> $$||\mathbf{x}|| = 0 \;\Rightarrow\; \mathbf{x} = \mathbf{0} \tag{2.3}$$
> $$||\lambda \mathbf{x}|| = |\lambda| \cdot ||\mathbf{x}|| \tag{2.4}$$
> $$||\mathbf{x} + \mathbf{y}|| \leq ||\mathbf{x}|| + ||\mathbf{y}|| \tag{2.5}$$

2.3   Notations

Notation 2.1. *Given an open subset G of $\mathbb{R}^n$, the set of functions φ are:*
  1. *Bounded support G;*
  2. *Infinitely differentiable;*
a vector space is denoted by $\mathscr{D}(G)$.

2.4   Remarks

This is an example of a remark.

> **R**   The concepts presented here are now in conventional employment in mathematics. Vector spaces are taken over the field $\mathbb{K} = \mathbb{R}$, however, established properties are easily extended to $\mathbb{K} = \mathbb{C}$.

2.5   Corollaries

This is an example of a corollary.

> **Corollary 2.5.1 — Corollary name.**   The concepts presented here are now in conventional employment in mathematics. Vector spaces are taken over the field $\mathbb{K} = \mathbb{R}$, however, established properties are easily extended to $\mathbb{K} = \mathbb{C}$.

2.6   Propositions

This is an example of propositions.

2.6.1   Several equations

Proposition 2.6.1 — Proposition name.   It has the properties:

$$\big|||\mathbf{x}|| - ||\mathbf{y}||\big| \leq ||\mathbf{x} - \mathbf{y}|| \tag{2.6}$$

$$||\sum_{i=1}^{n} \mathbf{x}_i|| \leq \sum_{i=1}^{n} ||\mathbf{x}_i|| \quad \text{where } n \text{ is a finite integer} \tag{2.7}$$

2.6.2   Single Line

Proposition 2.6.2   Let $f, g \in L^2(G)$; if $\forall \varphi \in \mathscr{D}(G)$, $(f, \varphi)_0 = (g, \varphi)_0$ then $f = g$.

2.7   Examples

This is an example of examples.

2.7.1   Equation and Text

■ **Example 2.1**   Let $G = \{x \in \mathbb{R}^2 : |x| < 3\}$ and denoted by: $x^0 = (1, 1)$; consider the function:

$$f(x) = \begin{cases} e^{|x|} & \text{si } |x - x^0| \leq 1/2 \\ 0 & \text{si } |x - x^0| > 1/2 \end{cases} \tag{2.8}$$

The function f has bounded support, we can take $A = \{x \in \mathbb{R}^2 : |x - x^0| \leq 1/2 + \varepsilon\}$ for all $\varepsilon \in \,]0; 5/2 - \sqrt{2}[$.   ■

2.7.2 Paragraph of Text

■ **Example 2.2 — Example name.** Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

■

2.8 Exercises

This is an example of an exercise.

Exercise 2.1 This is a good place to ask a question to test learning progress or further cement ideas into students' minds. ■

2.9 Problems

Problem 2.1 What is the average airspeed velocity of an unladen swallow?

2.10 Vocabulary

Define a word to improve a students' vocabulary.
Vocabulary 2.1 — Word. Definition of word.

3 — Presenting Information

3.1 Table

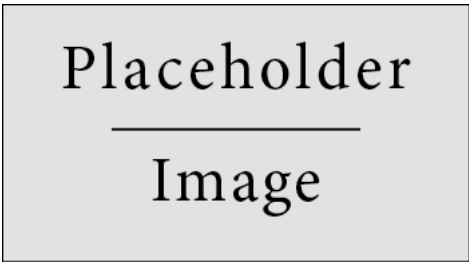| Treatments	Response 1	Response 2
Treatment 1	0.0003262	0.562
Treatment 2	0.0015681	0.910
Treatment 3	0.0009271	0.296

Table 3.1: Table caption

3.2 Figure

Placeholder
Image

Figure 3.1: Figure caption

Bibliography

Books

Articles