

# Master Brewers Safety Toolbox Talk



## Hose System Pressures and Temperature Effects

### Overview

When looking at a brewery hose you will usually see a pressure rating on the layline of the hose. The reality is that the hose is only one part of a system of components that may have different pressure and temperature capabilities. This "Toolbox Talk" will focus on hose system pressure calculations and the effects of temperature.

Breweries, distilleries, and wineries go through many processes in making the product where the temperature may fluctuate. Transfer hoses have specific pressure and temperature capabilities, as do the fittings and gaskets.

Below are examples of hose system components and their pressure ratings. Unless specifically stated otherwise by the manufacturer, all pressure ratings are based on ambient temperature of 70°F.

### Hose Type, Temperature, and Typical Pressure Ranges

- **Chlorobutyl:** -40°F to 240°F  
150psi to 250psi
- **Nitrile:** -40°F to 180°F  
150psi to 250psi
- **EPDM:** -20°F to 212°F  
150psi to 230psi
- **UHMW FDA:** -40°F to 225°F  
150psi to 200psi
- **PVC:** -10°F to 150°F  
20psi to 300psi
- **Silicone:** -100°F to 350°F  
5psi to 230psi

### Brewery Fittings – Tri-Clamp & DIN

Crimp shank with machined ferrule

- 1" and 1-1/2" 500psi
- 2" 400psi

Crimp shank with 2 bands ½" wide

- 1" 130psi
- 1-1/2" & 2" 100psi

Long shank Tri-Clamp

- Not Rated

### Attachment Methods for Hose or Tubing

- **Worm Drive Clamp:** Designed for low psi, low temperature.
- **Band Clamp** (Center Punch)
- **Crimp Ferrule:** Can be used with machined ferrule or band clamps

### Other System Components

- Tri-Clamp Clamp (Single Pin)  
1" & 1-1/2" 500psi  
2" 450psi
- Tri-Clamp Gasket  
Silicone-EPDM-PTFE  
Same pressure as clamps  
Range: -35°F to 450°F

### System Rating Calculations

The pressure rating of a hose system will be the lowest PSI rating of all components in the system.

#### Example #1:

**Hose: 1-1/2" Chlorobutyl** 250psi  
Fitting: Crimp shank w/ ferrule 500psi  
Clamp: Tri-Clamp Single Pin 500psi  
Gasket: EPDM (Same as clamp psi)  
The lowest PSI rating is your system pressure: **250psi @ 70°F**

#### Example #2:

**Hose: 1-1/2" FDA PVC** 75psi  
Fitting: Crimp shank w/ 2-Bands 100psi  
Clamp: Tri-Clamp Single Pin 500psi  
Gasket: EPDM (Same as clamp psi)  
The lowest PSI rating is your system pressure: **75 psi @ 70°F**

### Temperature Derating Factors

As temperature increases the working pressure of a hose decreases. Manufacturers have tested hoses at temperature and come up with derating factors based on the type of hose.

[Open deration chart](#)

To determine the capability of a hose system at higher temperatures, first calculate the system pressure at

ambient and then apply the derating factor:

#### Example #1:

##### Chlorobutyl Hose Assembly

Brewing liquid transfer operating at 90 psi at 150°F.

Temperature Derating Multiplier = 0.64  
Assembly Rating = 250psi x 0.64 =  
160psi (Safe Hose Assembly)

#### Example #2:

##### PVC Hose Assembly

Brewing liquid transfer operating at 70 psi at 130°F  
Temperature Derating Multiplier = 0.48  
Assembly Rating = 75psi x 0.48 =  
36psi (Unsafe Hose Assembly)

### Effects of unsafe assembly:

- Injury to self and others (i.e., Burn, fitting extraction)
- Product loss
- Slip Hazard

It is common for brewers to use a single type of hose for multiple applications. Care must be taken that each hose system is evaluated against the requirements of each process. Unfortunately, not all hose systems work in all processes and therefore injuries and failures happen.

It is highly recommended that you convey all your process details to your hose expert whether in-house or outside source.

**If you have any questions regarding this, please see your supervisor/manager or a member of the Safety Committee.**

Check out the Safety Toolbox Talk on [Hose Fitting Attachment Methods](#) for additional information.

FOR MORE INFORMATION ON  
BREWERY SAFETY, PLEASE VISIT  
THE MBAA BREWERY SAFETY  
WEBSITE AT:

<http://www.mbaa.com/brewresources/brewsaet>