

Standard Thermowells for Industrial Applications



Velocity Ratings of Wells

Well failures, in most cases, are not due to the effects of pressure and temperature. The calculations necessary to provide adequate strength under given conditions are familiar enough to permit proper choice of wall thickness and material.

Less familiar, and more dangerous, are the vibrational effects to which wells are subjected. Fluid, flowing by the well, forms a turbulent wake (called the Von Karman Trail) which has a definite frequency based on the diameter of the well and the velocity of the fluid. It is important that the well has sufficient stiffness so that the wake frequency will never equal the natural frequency of the well itself. If the natural frequency of the well were to coincide with the wake frequency, the well would vibrate to destruction and break off in the piping.

On the following pages, a recommended velocity rating can be found for every standard well length and material cataloged. To reduce the complexity of presenting this information, the ratings are based on operating temperatures of 1000°F for wells made of Carbon Steel (C-1018), ANSI 304, and ANSI 316. Values for Brass wells are based on 350°F operation. Limits for Monel are based on 900°F service. Slightly higher velocity is possible at lower temperatures.

Where single values appear in the velocity tables, these may be considered safe for water, steam, air or gas. In the shorter insertion lengths, consideration is given to the velocity pressure effect of water flowing at higher velocities. The values in parentheses, therefore, represent safe values for water flow, while the unbracketed value may be used for steam, air, gas and fluids of similar density.

It should be pointed out that the values given are extremely conservative, and intended primarily as a guide. Wells are also safe if the resonant frequency is well below the wake frequency or if the fluid velocity is constantly fluctuating through the critical velocity point. Nevertheless, if the installation is not hampered by the use of a sufficiently stiff well, we recommend the values should not be exceeded.

If you have operating conditions requiring special well designs, our engineering staff is available to assist you. Consult Tempco with your requirements.