Defining WOG (Water, Oil, Gas)

NIBCO and industry classify bronze and iron valves by their pressure/temperature limitations. As the temperature rises, the strength of the metal will decrease. For this reason valves are classified by the upper temperature limitation (SWP or Steam Working Pressure) and ambient temperature limitation (WOG or Water, Oil, Gas).

Steam is well defined and the temperature/pressure relationship as determined from a steam table. Steam is vaporized water at a specific temperature, specific pressure and contains a specific amount of heat.

“WOG” is simply defined as water, oil or gas and traditionally accepted as a catch all for ambient temperature fluids. The definition of water is simple – H₂O. The terms oil and gas are a little less clear. We often think of oil as a hydrocarbon. Oils are also made from animal fats and vegetables. In valve selection oil is a liquid that is thicker than water, has lubrication characteristics and flows freely. Gas is meant as a vaporized liquid. Gas then can be air, hydrogen, nitrogen, oxygen, etc. But the real meaning remains “ambient temperature fluids.”

The pressure/temperature rating on a valve or in the literature does not mean that the valve will function satisfactorily within those limits. The pressure/temperature rating SWP and WOG only refers to the pressure-containing vessel – the body and bonnet. The material, wall thickness and design will contain the media up to the rated pressures and temperatures. The rating does not relate to the performance of the trim or the compatibility of the valve to the media. The following are a few descriptions of pressure rating:

- UA’s INSTRUCTION MANUAL FOR STEAMFITTER-PIPEFITTER JOURNEYMEN & APPRENTICES, 1996: “The WOG (Cold Water, Oil, Gas) rating indicates the maximum non-shock pressure at ambient temperatures at which the valve may be used.”

- Stockholm’s Catalog 83 refers to “pressure-containing parts” on the pressure/temperature charts.

- Plant Engineering, “VALVE FUNDAMENTALS”, August 7, 1980: The pressure rating is determined by the design and the allowable stresses for materials of construction at the temperature limit…The WOG rating indicates the maximum non-shock pressure at which the valve may be used.

- Chemical Engineering, “A GUIDE TO SELECTING MANUAL VALVES”, September 1, 1986: “Maximum pressure ratings are based on body wall and flange design.”

- MIL-V-18436E, “VALVES, CHECK, BRONZE, CAST IRON & STEEL BODY” March 2, 1981, Section 3.6.2, WOG Rating: “The WOG rating is the maximum non-shock pressure, expressed in psi, for which the pressure-containing parts of the valve are...
rated when the coincident media temperature is between -20°F and 150°F for bronze body and cast-iron body valves and -10°F and 100°F for steel body valves. The WOG rating indicates the ability of the valve to withstand the pressure effect of water, oils, and gases and does not imply that a WOG-rated valve will necessarily withstand the potentially deleterious effect of all aqueous solutions, petroleum products and gaseous media unless appropriate material selectivity has been exercised."

The WOG rating has not been a good description and there is movement within the industry to the more descriptive CWP (Cold Working Pressure). Regardless of what it is called, it remains a limitation of the pressure valve only. The valve type, material and trim are different for each application. The pressure/temperature limitations of the pressure-containing vessel are a few of the several variables that must be considered.