



WARD W. RISTAU, P.E. 1942-2007

PermaCold Engineering owes its existence to Ward W. Ristau, P.E. In 1993, Ward became the founding President of what has become the largest refrigeration contractor in the Pacific Northwest. Although he faced very stiff competition in the refrigeration contracting market, he felt that if he put together the right team of people, and held to his belief that "Refrigeration is an Engineered Product", PermaCold would be successful. Ward not only invested his time and money, but also invested himself in the people that he surrounded himself with; his employees and his two partners, Steve Jackson and Randy Cieloha. Under his stewardship and guidance, PermaCold Engineering did become the company that Ward had envisioned in the early 1990s.

On September 30, 2007, Ward W. Ristau, P.E. died of pancreatic cancer. He will be remembered fondly and missed by over sixty employees and their families, whom Ward referred to as the "PermaTroopers". He leaves behind his beloved wife and best friend, Jeanette, who was always his confidant and constant companion. If ever there was a definition of True Love, it was Ward's love for Jeanette.

Ward, always a stickler for details, had put into place a succession plan for the ownership of PermaCold Engineering

early on. That plan has been executed with Steve Jackson assuming the Presidency and Randy Cieloha as Vice President. Both have worked with Ward for over thirty years and PermaCold Engineering is poised to be stronger than ever.

Ward was known for many talents by his family, friends and associates. The most prominent of those many talents was being a mechanical engineer. He had the ability to bring engineering into a common sense manner so that anyone he was working felt at ease. Ward is also famous for his writing skills and his "position" papers. He was never accused of turning in a job quote to a customer that left anything unsaid. He could also be counted on to fire off letters to our elected representatives on issues he felt important. As an avid reader, he continuously copied newspaper articles and cartoons to hand out to those whom he thought might enjoy or benefit from the information. Ward, a life-long Reagan Republican, would solidify his thoughts after a discussion of politics by sending you a book supporting his argument. The book stores are going to miss Ward.

Ward was a very thoughtful, kind and compassionate person. He enjoyed watching others grow and succeed and would do what he could to aid the process. He commented many times,

"Our job is to leave the world a better place". Ward W. Ristau, P.E. has left the world a better place, and will always be remembered. With much love and appreciation, we all say goodbye and thank you for everything, Ward.



Ward's family has asked that in lieu of flowers, remembrances in the form of donations in Ward's name be made to the Fred Hutchinson Cancer Center in Seattle, Washington or the Ann Marie Kempczinski Foundation (educational trust), 12 Evergreen Ave., Rye, New York 10580.

**Our job is
to leave the
world a
better place.**

Ward W. Ristau, P.E.

Upcoming Shows & Events

103rd Midwest Food Processors Association Convention & Expo

November 27 - 29, 2007

Milwaukee, Wisconsin ~ www.mwfpa.org

International WorkBoat Show

November 28 - 30, 2007

Ernest N. Morial Convention Center, New Orleans ~ www.workboatshow.com

2008 Northwest Food Manufacturing & Packaging Expo

January 13 - 16, 2008

Oregon Convention Center ~ Portland, Oregon

Come See Us In Booth #437 & 439! You won't want to miss this event. This year there will be RETA testing at the Expo.

RETA Industrial Refrigeration Review Course

January 14 - 16, 2008

Oregon Convention Center ~ Portland, Oregon

Cost: \$550 (Fee Includes Refreshments and Course Materials - Exam Fees are Not Included)

To Register, Contact Debbie Huserik at 503.249.8190 or debbie.huserik@permacold.com

2008 Ammonia Safety Training

February 18 - 22, 2008 ~ Portland, Oregon & Pasco, Washington

Another great training is being planned. Details to follow in the Winter Newsletter. Mark your calendars now so you don't miss this great event.

CONFUSION IN THE WORLD OF RELIEF VALVE EXIT PIPING

By: Ward W. Ristau, P.E.

For what must have seemed like a 100 years or so, the ammonia refrigeration industry had what has proved to have been a good method of sizing the exit piping of pressure relief valves. Until the ammonia/water dilution tank was added, most of these relief valve exit piping systems discharged to atmosphere. The best proof of the success of these sizing methods was the fact that no one, not even the "Old Timers", can recall a single tank ever "blowing" up due to under-sizing of these exit pipes.

Over at least the past 30 to 50 years (until about 2000), the sizing of this piping was based on a formula adopted by the industry for this purpose many years ago. It obviously served the industry well. In the Famous Formula section of this newsletter, we have shown this formula and noted it as "Formula A – Old Formula". This formula was still published in the mechanical codes throughout the 1990s, including the 1997 Uniform Mechanical Code (UMC). Accordingly, it was used to size this piping throughout the 1990s until about 2000.

In the middle to late 1990s, an element within IIAR, based on some research that had been conducted, decided that the old method was woefully short in its assumptions, particularly with regard to allowing something for the back pressure created in the exit piping. In other words, this assumption made the old and reliable formula questionable.

In these late 1990s, apparently "research" overcame "historical experience" and the industry decided to adopt a new formula. This new formula was strongly promoted since it now took into account important factors, such as back pressure in the equivalent footage of the exit piping, friction factors of the pipe and other factors of significance.

The new formula was hailed and introduced into the literature of the industry, including IIAR and ASHRAE

standards. This formula is shown as "Formula B – New Formula" in the Famous Formula section of this newsletter.

The new formula in general leads to the calculation of larger exit piping. Obviously, if it leads to larger pipe diameters, it must be safer for vessel protection or, at the very least, more conservative from a safety point of view. At the same time, because it leads to larger piping for this purpose, it is also more expensive.

The new formula came into the new codes in the early 2000s via the IIAR and ASHRAE standards. These industry standards are a part of the codes by direct reference. This then drew a line between those systems installed in the 1990s and before and those built in about 2000 and after. The pre-2000 systems were installed with the generally smaller exit pipes and those after with the larger piping systems.

With both formulas hanging around in recent times, this has caused some confusion. For example, some safety audits have been conducted on the older systems with the exit piping being condemned. Since building codes have always worked on the principle that facilities need to be built in accordance with the codes in force at the time, such audit evaluations have been in error. In other words, if a given plant was built pre-2000 and its exit piping was calculated under the old formula, then that piping is acceptable under the what is generally called the "grandfather" provision. Unless a specific local building code official was to insist for some good reason that a given plant be updated to new code requirements (perhaps to the new formula for example), there is no requirement to change things.

For the foreseeable future, the "New Formula" will be in full force and effect and is to be used in the calculation of new relief valve exit piping. Fortunately,

even though this new formula looks very complicated, when compared to the old one, the industry and its relief valve manufacturers have worked out relatively simple tables for sizing these lines. There is no need to dedicate a separate computer to run relief valve exit sizing calculations.

Many in the industry are questioning the validity of the new formula. After all, the old one worked just fine for a whole lot of years and those systems proved to be very safe with regard to proper relief valve protection. So, perhaps these formulas will be re-visited at some future time. Just from the standpoint of cost, this would seem to be a reasonable thing to do.

From an engineering point of view, it is interesting to think of all this in one sense relative to the new formula. After all, when we actually size a relief valve for a given pressure vessel, the formula is a very, very simple one. It is $C = f \times D \times L$. Here, "C" is the minimum required rated discharge capacity of the relief valve in pound per minute of air. "f" is the factor for the refrigerant involved (0.5 for ammonia). "D" is the diameter of the pressure vessel in feet and "L" is the length of the vessel in feet. It doesn't quite seem logical that the sizing of a relief valve for a pressure vessel could be so simple, while the sizing of its exit piping could be so complicated. Logic would tell us that one is too simple and the other too complicated. Accordingly, one or both are logically wrong. If only we could still get Einstein to come back and take a look at this for us.

So, in conclusion, all of this is a bit confusing but not overly so. Based on either current good engineering principles or historical safety data from over the past 100 years, you probably have a safe plant in terms of the relief valve exit piping, whether the facility is pre-2000 or post-2000. There are probably more important matters to worry about.

FORMULA "A" - The OLD Formula

$$L = \frac{9P^2 d^5}{16C^2}$$

WHERE:

L = Length of discharge pipe in feet (m).

C = Minimum discharge capacity in pounds of air per minute (kg/s).

d = Internal diameter of pipe in inches (mm).

P = (Rated valve pressure PSIG x 1.10) + 14.7.

FORMULA "B" - The NEW Formula

$$L = \frac{0.2146d^5(P_0^2 - P_2^2)}{fC_r^2} \frac{d * \ln(P_0/P_2)}{6f}$$

WHERE:

L = Length of discharge pipe in feet (m).

C_r = Rated capacity of valve in pounds per minute.

f = Moody friction factor in turbulent flow.

d = Inside diameter of pipe in inches.

ln = Natural logarithm.

P_2 = Absolute pressure at outlet of discharge piping.

P_0 = Allowable back pressure (absolute) at outlet of pressure relief valve).

(NOTE: For conventional relief valves, 15% of set pressure is as unless specified by manufacturer. 15% of set pressure can be assumed so then $P_0 = (0.15P) + 14.7$.)

The above article *Confusion in the World of Relief Valve Exit Piping* was written in the Summer of 2007 by Ward W. Ristau, P.E..

NORTH STAR ICE EQUIPMENT NOW AVAILABLE AT PERMACOLD ENGINEERING

We are pleased to announce to all of our Pacific Northwest customers that PermaCold Engineering is the only Oregon authorized dealer for North Star Ice Equipment. North Star continues to set the standard for flake ice production and ice handling technology by developing new products that maintain high standards of quality, technology and design. The company combines a commitment to innovation with over 50 years of ice making experience to manufacture a line of ice making and handling equipment our customers can rely on. PermaCold is proud to be able to offer these additional quality products to our customers.

North Star