INTRODUCTION AND APPLICATIONS OF Y STRAINERS

Y strainers are devices for mechanically removing solids from flowing liquids or gases by means of a perforated or wire mesh straining element. They are used in pipelines to protect equipment such as pumps, meters, control valves, steam traps and regulators.

Although there are occasional exceptions, the use of Y strainers generally follows several rules. First, they are ordinarily employed where the amount of material to be removed is small. Size for size, their dirt holding capacity is less than a basket strainer. Next, Y strainers are usually installed when frequent clean-out is not needed. There are Y strainers in service on steam lines, for example, that are not cleaned more than once a year. Generally, Y strainers are used with gases such as steam or air. Basket strainers are used with liquids.

For handling steam, a Y strainer is the standard and is almost universally used. Its compact, cylindrical shape is very strong and can handle high pressures. It is, literally, a pressure vessel. Y strainers, which handle pressure upto 6000 psi, are not uncommon. Of course, in these cases, safety is very important and Y strainers, if properly designed, can be used at these pressures without fear of failure. When high-pressure steam is being handled, another complicating factor arises – temperature. With steam pressures of 1500 psi or higher, standard carbon steel is sometimes not suitable because the steam temperature may be 1000 degrees F or even higher. In these cases, the Y strainer body is generally made of chrome-moly steel.

Besides steam, the other gases most commonly used and requiring strainers are air and natural gas. Here again, high pressures are not uncommon. However, unlike steam, high air pressure does not automatically mean high temperature and so ordinary carbon steel bodies of sufficient wall thickness will generally suffice.

A Y strainer has the advantage of being able to be installed in either a horizontal or vertical position. Obviously, in both cases, the screening element must be on the ‘down side’ of the strainer body so the entrapped material can properly collect in it.

Size for size a “Y” strainer will offer more pressure drop than a basket strainer since its free straining area is less. This is why basket strainers are preferred for liquids. Gases, being readily compressible, will flow through “Y” strainers of the same size as a pipeline easily, with little pressure loss. This is assuming the “Y” strainer is properly designed and of adequate size. Some manufacturers reduce the size of the “Y” strainer body to save material and to cut costs. Before installing a “Y” strainer be sure it is large enough to properly handle flow. A low priced strainer may be an indication of an undersized unit.

Select the Right Material of Construction

Y-strainers are almost always supplied in one of four materials, cast iron, bronze, carbon steel or stainless steel. Cast Iron is most widely used because it costs the least. Its disadvantages are poor resistance to thermal shock and poor resistance to mechanical shock. For these reasons cast iron is used in non-critical applications involving low pressures and temperatures.

Bronze is the second material of which "Y: strainers are made. It has better thermal and mechanical shock qualities than cast iron, and therefore, is sometimes preferred for low-pressure steam service. However, it is limited in temperature to a maximum of 176^0 C.

Carbon Steel is the third material and is best when strength, temperature or mechanical shock resistance are important. Many engineers specify carbon steel even when cast iron may be suitable. The additional cost is miniscule when spread over the years of actual service and a good safety factor is built in. Particularly with steam, the chance of an accident is not worth using the lower priced cast iron in place of more dependable steel.

The last common material for strainers is stainless steel. This, of course, is used where corrosion is a problem. Many gases such as those from petroleum operations or natural gas are sour or acidic and when moisture is present iron or steel will corrode. In these cases stainless steel is specified.

What design features to check

It cannot be stressed to highly that "Y" strainers must be designed with adequate safety margins. This means sufficiently heavy wall thickness and blow off connections. As an example, in improperly trapped steam lines condensate can collect in low points and become a slug of water traveling at a very high velocity down the line. Even a slight change in direction caused by a Y-strainer can produce a tremendous shock that can break the strainer wall. Manufacturers who thin down walls to save weight and cost are asking for trouble in these cases.

A Y-strainer is, in a sense a self –cleaning strainer. Many are fitted with a blow off connection to which a valve can be attached. Simply opening and then closing the valve without shutting of the flow or disaasembling the stariner can thus clean the screen. The old saying "A chain is no stronger than its weakest link" applies here; a Y-strainer is no stronger than its clean out connection. These features should always be checked. In large sizes where the clean out connection is flanged, the flange should not be skimpy. It should also be properly sealed. For high temperatures or pressures, metallic reinforced gaskets should be used.

Another important design feature to check for in Y-strainers is the point where the screen or straining element seats on to body. This seat should be carefully machined so no particle should by-pass it. The same thing applies to the clean-out end. The screen should fit tightly. Beware of strainers with un-machined seats.

Strainer Screens – The "Heart" of a Y-Strainer

The screen, of course, is the heart of the Y-strainer and the point where the dirt or unwanted material is trapped. In the case of small sizes (up to 50 mm) a cylindrical wire mesh screen suffice if the pressure is not too high. For larger sizes a simple wire mesh cylinder does not have enough mechanical strength and it should be backed up with a perforated metal cylinder. Stainless Steel is the preferred material for Y-strainers screen and is used with almost all Y-strainers regardless of material of construction.

What to Look For in Piping Connections

Y-strainers are available in a wide variety of end types. Cast Iron and Bronze are always supplied with threaded or flanged end connections. Carbon Steel and Stainless are also furnished in these end connection types. A variety of flanged connections are also available.

In addition to flanged and threaded connections, carbon and stainless steel Y-strainers are also available with socket weld and butt weld end connections. These are used mostly for high-pressure applications, 40 Kg/cm^2 and above. Socket Weld connections above 50 mm are not encountered often.

What to Consider Before Buying a Y-Strainer

When buying a Y-strainer, price that is often the prime consideration should be the least. A well made properly designed Y-strainer will last almost indefinitely. Its initial cost is therefore not important compared to the features when spread out over a service life of many years. Check:

- Are the seats properly machined to eliminate bypassing of dirt?
- Is the body strong enough to resist mechanical shock and avoid accidents?
- Are blow-off connections heavy enough to avoid leakage of failure?
- Is the screen made properly to eliminate possibility of collapse?

All the above factors should be considered before installing a Y- strainer.