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To: General Distribution

"What are M & Y Values?"

We are frequently asked to provide M & Y values for our gaskets so that the customer can design flanged joints using the ASME Boiler and Pressure Vessel Code. Occasionally, we are asked to explain how these values are used and how they are determined for our gaskets.

(Be sure to see the notes below on M&Y Testing)

In simple terms, a flange must be designed to create sufficient compressive load (usually expressed in stress, as psi) on the gasket contact area to create an initial seal. The gasket must conform to the flange surface (serrations when present) and must be compressed enough to seal off any internal voids or spaces. This stress is basically the "Y" value.

The "M" value allows the flange designer to determine the compressive load on the gasket required to maintain a seal when the vessel is pressurized. The flange must have sufficient strength and bolting to hold the joint together against the hydrostatic end force, and to apply some additional "net stress" on the gasket.

The "M" value is used as a multiplier or maintenance factor. The design will be such that the flange and bolting will hold the flanges together under pressure (the hydrostatic end force) and exert an additional stress on the gasket of "M" multiplied by the internal pressure.

The designer calculates the load required to seat the gasket (related to "Y") and performs a second calculation using the "M" value and the design internal pressure. The flanges are then built based on the larger of the two calculated values.

M&Y Testing:

The previous ASTM M & Y test method, as well as the proposed new method requires determination of the Y value with an internal pressure of 2 psig and the M value at 300 psig (since M factors are related to OPERATING conditions). The new method was developed by the Gasket Committee of the FSA (Fluid Sealing Association); Garlock assisted with this effort. In our opinion, the most important improvement with this new standard is the requirement that the media and leak rate must be specified when publishing values. However, this reporting method is voluntary, so the manufacturer may decide to not comply when publishing values for their products. This standard is now also being adopted by ASTM committee F3 on gaskets.

For the Y value, we increase the compressive load in steps and measure leakage at each step. In most tests, we stop when we find the compressive stress that achieves the leak rate we have chosen as a "maximum allowable leak rate" for that gasket. For the M value, the gasket is first compressed (at a stress of 6770 psi) and then pressurized at 300 psig. The stress is LOWERED in steps until the gasket starts to leak. Again, we have a defined leak rate we are looking for. Once the gasket leaks above that max rate, we
record the last stress value BEFORE the leakage increased past our allowable. The reason the gasket is loaded first is that the M value is used in the ASME calculations to determine the load needed AFTER the gasket has already been installed and compressed in the flange.

Comparing M&Y values from other manufacturers:

One very important note on M&Y values is that there have been no established rules to decide what values to publish. A manufacturer could (and still can) publish numbers that are “found by experience to be workable” or some companies simply used the old values for CAF (compressed asbestos fiber) found in the ASME table of suggested values. But the issue is “when is the gasket considered to be sealed?” Garlock has always used leak tests with nitrogen gas to determine our values, and we state what criteria we used to decide that the values represented a reasonably tight seal. We state what the maximum allowable leak is in our tests, and we chose a fairly tight seal.

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