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TECHNICAL BULLETIN

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Gate Valve Installation & Leakage

This technical bulletin addresses some common issues related to iron or steel flanged gate valve installations and leakage. It is generic in nature and meant to highlight certain important considerations in play.

The iron valves are designed, built, and tested to Manufacturer's Standardization Society (MSS) standard MSS SP70. The steel valves are designed and built in accordance with American Petroleum Institute (API) 600 and tested per the applicable sections of API 598.

In both cases, seat leakage tests are performed on factory new valves with the stem vertical and the maximum handwheel torque applied, with measurable leakage allowed at the test pressures involved (i.e., full rated pressure for the iron valves, 60-100 psig for the steel valves, unless a high-pressure closure test is specified by the purchaser).

Insofar as the valves are metal seated, and by specification have allowable leakage when tested new at the factory, it can be inferred that there will be increased leakage at lower pressures (since pressure assists sealing), particularly when the valve is installed stem horizontal (as discussed further below), or when steam or gas is the application fluid, as gas will traverse an available leak path more readily than liquid.

When valves are installed with the stem horizontal, leakage generally increases. The horizontal stem results in an increase in wedge friction against the cast guiding surfaces within the body, which means that for a given hand wheel torque, the amount of load that goes to seating is reduced (lost in friction). The larger the valve, the more this is true. The wedge needs to be lifted up into the seats, which for large valves can take a significant input load. Oftentimes, large gate valves are installed this way with chain fall operators on them that impede the operator's ability to apply adequate torque to the valve, which can exacerbate a problem situation.

The translation of these points is that in some cases, flanged gate valves might not be the best product choice for a vertical pipeline operating on low pressure gas or steam. The larger the valve, the more this statement may be true. Condensate lines typically involve this type of installation, and for those, a high-performance butterfly valve might well make a better product choice for performance and reliability. It is true that historically, gate valves have been used in these (low pressure vertical pipelines) services, and can continue to be, as long as the expectations of the valve's performance does not exceed its specification capability. The fact that the valve will leak to a small degree needs to be considered, and provisions made, e.g., providing a drain line to capture and reroute any leakage so it does not accumulate in a boiler or elsewhere where it could be detrimental.

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Regarding SP70 iron valves with bronze trim, it is worth mentioning that metal seated valves are frequently affected (adversely) by line debris, and this valve especially so as the (relatively) soft bronze trim can be scratched by hard metal debris or other hard particulates that is often present in pipelines due to poor cleanup of interior piping surfaces following fabrication.

From that perspective, leakage reports for installed valves must be considered in the light of this possibility.

Prior to sale, the education of the end user or their engineering designee regarding the above points is critical to customer satisfaction. After the point of shipment, any leakage reports pertaining to flanged metal seated gate valves should be evaluated in light of the information in this technical bulletin.

All Milwaukee Valve Company product is 100% tested to the applicable specifications prior to shipment. This fact, taken with the above points, puts us in the position of defending the product first, and looking for application-based reasons behind any reported problems after that. Milwaukee Valve Company manufactures valve products to industry specifications; all decisions regarding valve installation are job specific and the responsibility of the end user or their engineering designee to resolve.