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Re: Evaluating Spiral Wound Gasket Quality

Dear Valued Member:

There are various factors in evaluating the quality of a Spiral Wound Gasket (SWG). The American Society of Mechanical Engineers (ASME) has defined a construction and performance standard for which all spiral wound gaskets may be compared. The assessment of the quality of a gasket can also be boiled down to its visual/physical characteristics and the inherent support activities surrounding its manufacture. These support activities include the manufacturing processes, quality controls, and testing utilized by the manufacturer. The best assessment of the quality of a gasket uses this holistic view of the gasket itself and the support activities surrounding its particular manufacture.

The ASME B16 Subcommittee is responsible for the standardization of valves, flanges, fittings, and gaskets. ASME B16.20-2017 is the latest revision of standards manufacturers should follow in the manufacture of spiral wound gaskets. The defined standards found within ASME B16.20-2017 provide guidelines regarding size and class, dimensions and tolerances, materials, and markings. At a minimum, adherence to ASME B16.20-2017 should provide a buyer with a minimum sense of security that the manufacturer is providing a gasket that may be reasonably compared across different manufacturers.

The gasket should be constructed using appropriate dimensions and methods that ensure it is suitable for the intended flange size and pressure class. The dimensions of the gasket shall comply with the specifications delineated within ASME B16.20-2017. The construction of the gasket requires "alternate plies of preformed metal windings and pliant fillers that are spirally wound". Guidelines for spot welds and terminal welds have been provided by ASME. The appropriate number of welds are needed to ensure the sealing element remains intact on the inner and outer plies of metal winding wire. A centering ring shall be applied to the gasket to provide greater mechanical stability for the windings. Inner rings are required for PTFE material, but are generally recommended for all spiral wound gaskets. Inner rings do act as additional compression stop, additional blowout resistance, and also reduce buckling. Specific metal windings and filler materials have been identified per ASME B16.20-2017. Permanent marking information is required on the centering ring which includes the manufacturer's name or trademark, flange size, pressure class, winding metal abbreviation, filler abbreviation, centering and inner ring abbreviation, flange identification, and ASME designation. Specific color coding on the outer edge of the centering ring is required to identify the windings and filler materials. All of these physical attributes ensures the buyer receives a gasket that is ASME compliant.

ASME B16.20-2017 also includes specific standards relating to testing and certain performance parameters. In order to be ASME compliant, the manufacturer must provide a gasket that does not compress below a certain level of thickness at a given stress level. This performance parameter is determined through a compression test applying a certain level of uniform gasket stress to the gasket. Please refer to SW-2.2 within ASME B16.20-2017 for the required compression specification applicable to each defined pressure class. ASME also specifies a performance test that measures the maximum leakage rate for each defined gasket pressure class. Methane gas is the required medium to be used in testing gaskets for leakage compliance according to ASME B16.20-2017. Leak detection using methane during the testing process more closely resembles the actual application in the field. Investments made by a manufacturer in leakage testing equipment provides the customer greater assurance that continuous testing of this ASME performance parameter is being conducted by the manufacturer. Please refer to SW-2.6 within ASME B16.20-2017 for the specified maximum acceptable leakage rate applicable to each defined pressure class. A reliable manufacturer can and should provide testing results demonstrating its gaskets meet or exceed these ASME standard testing thresholds. For greater level of assurance in the testing results, it is beneficial to also obtain data from reputable 3rd party testing facilities regarding the gaskets you purchase.

The physical attributes of a gasket can be measured through a visual inspection and a destructive test. A visual inspection of the gasket determines whether the external features of a gasket are ASME compliant as well as determining if the gasket is damaged. The markings on the outer ring can be viewed for compliance. Color coding on the gasket should also be inspected for compliance. Major blemishes on the gasket windings may result in a lesser performing gasket causing higher leak rate. Uneven gasket windings may cause the product to not perform effectively or seat properly on the flange. Verification of dimensions will also determine ASME compliance. Destructive testing allows for verification of the welds, a key element in maintaining the integrity of the gasket.

There are other factors that also contribute to the manufacture of a reliable spiral wound gasket. The manufacturer must ensure there are controls in place throughout the procurement and production process. Reliable machines and consistent production processes provide a greater likelihood product is ASME compliant. Quality control is also a key element in providing reliable raw material and finished product. Verification of materials through PMI (Positive Material Identification), is used throughout the procurement process and the production process. Inspections of dimensions and workmanship are integral to maintaining quality standards throughout the production process. Ensuring the manufacturer has effective production and quality controls provides greater reliability on the finished gasket.

The importance of testing is becoming more prevalent with the inclusion of a construction and performance standard in ASME B16.20-2017. The dependence on leakage rate results should increase since the passage of the revised ASME standard. The applicable quality assessment should involve the results of the construction and performance tests specified by ASME. These results are indicative of the level of quality control taking place during the material procurement and the production process. Continuous testing by the manufacturer that demonstrates a manufacturer is complying with ASME construction and performance standards enhances the reliability an end-user should experience when using that manufacturer's gaskets.

The gasket is usually the least expensive and least considered item in the flange joint. However, if the gasket is not ordered, manufactured, and installed correctly, it can become the most important and the most expensive item in terms of downtime, lost productivity, product loss,

emissions, fines, health, and safety issues. Important factors to consider in evaluating the quality of a gasket should include: adherence to ASME, physical characteristics of the gasket, and the underlying production and quality controls used by a manufacturer to provide a reliable, quality product. It is important to take a holistic approach when evaluating the quality of a spiral wound gasket.

Regards,

A handwritten signature in black ink, appearing to read 'MHA', with a stylized flourish at the end.

Maurilio Hernandez
Product Director – Semi Metallic Standards
The Flexitallic Group