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SPIRAL WOUND GASKET LEAKAGE PERFORMANCE VARIATION WITH FILLER VARIATION AND STANDARD ASME B16.20 CONSTRUCTION

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ABSTRACT

With the latest metallic gasket standard ASME B16.20 [1], including a leakage requirement for spiral wound style gaskets (SWG), leakage performance has added importance for today's industrial user community. Spiral wound gasket leakage performance information is sometimes available for B16.20 gaskets with standard geometry and consisting of a sealing element with metallic windings with flexible graphite (FG) filler and including both solid metal inner and outer rings. SWG leakage performance information on fillers other than FG is rare. Similarly, performance data on engineered SWGs that do not adhere strictly to the dimensional standards of B16.20 is also rare.

Industrial end-users commonly assume that polytetrafluoroethylene (PTFE) filled SWGs will seal more tightly than typical FG fillers. PTFE has a wider range of chemical compatibility than FG. Some compression problems have been experienced when using virgin PTFE (vPTFE) as a SWG filler; expanded PTFE (ePTFE) is also used as a more compressible version of PTFE. However, ePTFE does have air voids in the microstructure that some users object to because of concerns about their process permeating through ePTFE. Finally, where both requirements of a fire-safe gasket and process compatibility requiring a PTFE filler exist, a test filler combination of vPTFE/FG is included. The filler types that will be compared are FG, vPTFE, ePTFE, and a combination of vPTFE/FG. Two construction types will eventually be tested: standard ASME B16.20 geometry with both inner and outer rings and engineered SWGs. In this first paper, SWGs constructed according to ASME B16.20 are investigated. Future work will investigate engineered SWGs.

This paper compiles and compares leakage performance data for several standard ASME B16.20 SWGs with filler options: FG, vPTFE, ePTFE, and a combination of vPTFE/FG. These will be compared with engineered SWGs designed to solve some of the problems strictly B16.20-compliant SWGs have in some ASME B16.5 [2] flanges. The engineered SWGs will be tested with the same filler options in a future work. The ASME B16.20 standard SWGs will have 316L stainless steel inner rings and windings and a carbon steel outer ring; the engineered SWGs will have 316L windings and carbon steel outer rings. Leakage testing will be according to EN13555 [3] at 40 bar system pressure. The test gaskets will be sized for ASME B16.5 NPS 4 Class 150 flanges. Testing results will provide a data set to confirm (or deny) the assumption of superior sealing with various PTFE vs. FG fillers as well as comparisons between several manufacturers and designs strictly according to B16.20 and varying slightly in details.

Keywords: gaskets, leakage, spiral wound, filler, flexible graphite, PTFE, expanded PTFE, combination filler

