

PVP2017- 65734

EXPLORING M & Y GASKET FACTORS AND THEIR DEGREE OF CORRELATION WITH PROPOSED PVRC GASKET FACTORS

Dale A Rice, P.E.
VSP Technologies, Inc.
Leland, NC, USA

A. Fitzgerald Waterland, III
VSP Technologies, Inc.
Prince George, VA, USA

Anita R Bausman, P.E.
VSP Technologies
Kingsport, TN, USA

ABSTRACT

The well-known gasket factors, m & y were introduced in 1943 as per ASME Boiler and Pressure Vessel Code, Section VIII, Division 1 for purposes of flange design. The test procedure for determining these factors, ASTM Standard F586, was published in 1979 but then ultimately withdrawn in 1998 with the assumption that these test standards would be replaced by a new test method and with it the generation of improved gasket constants. The original m & y constants had several shortcomings including the fact that many of the listed values assumed asbestos fiber gaskets while new gasket materials such as PTFE (polytetrafluoroethylene) and FG (flexible graphite) were not addressed. Additionally, gasket manufacturers were allowed to publish m and y values for their own specific gasket materials and styles using their own test methods, thus dispensing with industry-wide standardization. ASTM Method F3149-15, "Standard Practice for Determining the Maintenance Factor (m) and Yield Factor (y) Loading Constants Applicable to Gasket Materials and Designs" represents an improvement over F586 but is not linked to standardized tightness levels. The proposed PVRC method with a new set of gasket constants is based on a load versus leakage test standard known as ROTT (Room Temperature Tightness Test). Following the ROTT method, ASTM WK39360, "New Test Method for Leak Rates Versus Y Stresses and M Factors for Gaskets derived from the Room Temperature Test Practice", is being contemplated. This paper provides a review of the past inconsistencies of m & y values as published as well as an initial assessment of the degree of correlation between m & y values and tightness calculations achieved through the use of a previously documented fugitive emissions calculator for gasket materials

which makes use of published ROTT data, and the operating pressure, flange NPS, gasket stress, and other inputs.

INTRODUCTION

As referenced previously by others, Rossheim and Markl's "Gasket Loading Constants", was published in the September 1943 issue of Mechanical Engineering [1, 2]. These same constants were adopted in the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1 as Table 2-5.1 (See Appendix 1). However, these constants were derived from a review with some modifications by Rossheim and Markl for commonly used gasket materials at the time and were not based on specific testing. In fact, a note for the materials listed in the code qualifies their use: "Tables 2-5.1 and 2-5.2 give a list of many commonly used gasket materials and contact facings, with suggested values of m , b , and y that have proved satisfactory in actual service. These values are suggested only and are not mandatory. Values that are too low may result in leakage at the joint without affecting the safety of the design. The primary proof that the values are adequate is the hydrostatic test." [3] Rossheim and Markl's list of "commonly used gasket materials" includes several that contain asbestos. Although asbestos use has not been entirely banned in the U.S. [4], it has been banned in many countries and industrial gasket makers have largely substituted asbestos with other fiber materials in compressed sheet materials. In addition, other materials have since entered the market including various gasket types containing PTFE, flexible graphite, etc., none of which are listed in Table 2-5.1.

Very little has changed since the addition of suggested m and y constants to the code, and gasket manufacturers have been free