

DETERMINATION OF OPTIMUM AMBIENT TEMPERATURE RE-TORQUE DWELL PERIOD FOR PTFE BASED GASKETS

Alfred F. Waterland, 111 (Jerry)
Virginia Sealing Products, Inc.
Hopewell, Virginia USA
jerry.waterland@vasealing.com

James E.B. Frew
Virginia Sealing Products, Inc.
Kingsport, Tennessee USA
jfrew.vasealing@charter.net

ABSTRACT

Gaskets must receive adequate, minimum assembly stress in order to develop the required level of joint tightness. Furthermore, operating stress levels must be maintained above a certain threshold throughout the service life of the connection in order to insure continued joint reliability and tightness (low leakage) performance. PTFE based gasket materials can exhibit significant initial and/or continued compressive flow, which translates into a loss of bolt load. Manufacturers and users of PTFE based gasket materials are advised to re-torque these connections, often after a 24 hour dwell period. The following research was conducted in order to determine if the specific PTFE material selected can influence the need for bolt re-torque, and additionally to determine if the re-torque dwell period can be reduced to a time period less than 24 hours.

INTRODUCTION

Manufacturers of PTFE based gasket materials recommend that PTFE gasketed connections be re-torqued after a minimum dwell period of 24 hours¹. In a plant environment or equipment repair facility it is often impractical to delay commissioning of a vessel or piping system for this 24 hour dwell period. Typically in this case, the re-torque is postponed and instead conducted sometime after the vessel has been in service, at temperature for at least a 24 hour period. As evidenced in Figure 1, there is immediate, significant gasket (and thus torque) relaxation that occurs in a bolted connection with certain types/constructions of PTFE based gaskets.

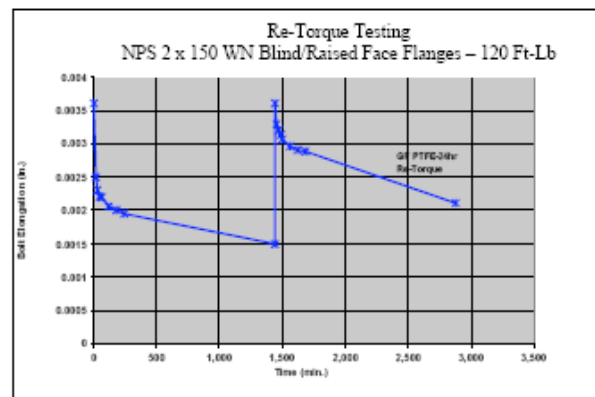


Figure 1: Typical Bolt Relaxation Glass Filled PTFE Gasket

In this test, with this particular gasket material, the bolt load diminished by almost 50% during the first 24 hours after assembly, at ambient temperature. Retorquing this connection reestablished the original assembly bolt elongation; however 24 hours after the re-torque we see that the bolt elongation continued to diminish at approximately the same rate as before the re-torque. This observation suggests that successful use of this gasket material may be dependant upon periodic bolt re-torque throughout the life of the connection.

Is this behavior typical of all PTFE based gasket materials, or are there meaningful differences between PTFE gasket technologies which prove beneficial in retarding this relaxation? Are there PTFE gasket technologies which could be selected which may not require a re-torque or that could be successfully re-torqued after a much shorter initial dwell period? Identification of such a material, or a simple test procedure for identifying such a material, will enable users to select the appropriate PTFE gasket technology for their application and, knowing the minimum satisfactory re-torque dwell period, to achieve improved load retention performance from their PTFE gasketed connections.

¹ Garlock Sealing Technologies. "Engineered Gasketing Catalog"

The goal of this research is twofold. First, to identify families, or types, of PTFE gasket technologies which exhibit