



Designation: F2467 – 06

Standard Practice for Measuring Static Sealing Pressure Using Pressure- Indicating Film (PIF) in Transportation Applications¹

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1. Scope

1.1 This practice covers a standard means for measuring initial static sealing pressure in transportation applications.

1.2 It uses a pressure-indicating film (PIF) that will record the maximum load imprint of the seal-to-flange interfaces. The imprints will vary in intensity based on load across and along the interface.

1.3 These imprints can be used to determine if initial load on the gasket is adequate to attain a seal. These imprints may also indicate correct bolt torque sequence. These imprints may also be used to determine if the mating surface waviness or local flatness meets gasket requirements. Roughness is rarely found by PIFs because peak-to-peak wavelengths are too short. PIF is very good at finding waviness (peak to peak > 2.5 mm) and local flatness dips. PIFs provide an approximation of maximum pressures, and do not take into account relaxation of the joint after the torque sequence. Other methods involving dynamic measurement should be used if flange loading after relaxation is desired.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Terminology

2.1 Definitions:

2.1.1 *pressure-indicating film (PIF), n*— film that will, under varying clamp forces, give a varying imprint or color density that correlates directly with the joint clamp force applied in a given area.

3. Special Test Equipment and Materials

3.1 Pressure-indicating film (PIF) in the required pressure range(s).

3.2 A bolt micrometer or torque wrench for quantifying fastener load or sequence or both. For yielded fastener applications, torque versus yield or angle recording equipment is also required.

3.3 Subassembly test stand with one set of mating parts of the joint (minimum) and a complete set of fasteners. A new set of fasteners for each run shall be used if the torque loading is high enough to cause plastic deformation of the bolts.

3.4 A sufficient quantity of gaskets to complete the required number of tests as agreed upon between producer and user. Reuse of gaskets after initial tightening is not allowed, unless approved by the user.

3.5 Manual densitometer or automatic scanning device for reading color density (optional).

4. Summary of Practice

4.1 PIF is placed between a gasket or seal and one or both of the mating flanges. Using the specified torque sequence, the assembly is clamped together. After the specified waiting period, the system is unclamped and the PIF removed. The visible color pattern denotes where clamp pressure is present. The approximate pressure can be determined from color density using a reflective (optical) densitometer or an automatic scanning device in conjunction with a computer conversion program designed for the films. Follow the PIF supplier's guidelines with regard to how color density relates to pressure for a given PIF.

5. Significance and Use

5.1 This practice is a screening tool and should be used in conjunction with other more accurate real-time load-measuring techniques.

5.2 This practice covers the use of PIF, which is available in several load ranges. This practice also covers the use of a manual or automatic scanning device to read indicated load.

5.3 Limitations include those applications in which the PIF may be kinked, twisted, or buckled. PIF does not withstand elevated temperature, low temperature, or fluid aging and does not take into account any relaxation of bolts, gasket materials, or flange twisting, as it provides only the maximum attained pressure.

¹ This practice is under the jurisdiction of ASTM Committee F03 on Gaskets and is the direct responsibility of Subcommittee F03.10 on Composite Gaskets.

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