

**MSS SP-100-2015**

# Qualification Requirements for Elastomer Diaphragms for Nuclear Service Diaphragm Valves

**Standard Practice**  
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Originally Approved: June 1988

Originally Published: September 1988

Current Edition Approved: August 2015

Current Edition Published: December 2015

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## QUALIFICATION REQUIREMENTS FOR ELASTOMER DIAPHRAGMS FOR NUCLEAR SERVICE DIAPHRAGM VALVES

### 1. SCOPE

This Standard Practice delineates a method for qualification of elastomer diaphragms, in accordance with methodology and documentation as described in Appendix QR-B of ASME QME-1, that are intended for use in ASME Boiler and Pressure Vessel Code, Section III, Classes 2 and 3 diaphragm valves. In addition, this Standard Practice establishes methods for production verification and for the development of service limits for Elastomer diaphragms.

**NOTE:** See MSS SP-96, “*Guidelines on Terminology for Valves and Fittings*” for definitions of common terms and acronyms used in this Standard Practice.

### 2. QUALIFICATION

2.1 The valve manufacturer shall prepare a test plan that details the procedures used to comply with the required tests of Section 2.2. The test plan shall state the rationale used to select the thermal aging temperature and time, radiation aging total dose, and pressure and temperature for the wear aging or cycle life test.

2.2 A specific diaphragm size, compound, design, and construction may be qualified by type testing. For each qualification step, testing shall be conducted on representative production diaphragms. This type testing shall include:

2.2.1 Thermal aging to qualify for a minimum period of time, as specified in Section 4.0. The thermal aging test should be based on *Arrhenius Law* to determine aging time and temperature.

2.2.2 Radiation aging to a total dose level at least equal to the requirements of the Design Specification or a dose level equivalent to the service life, as specified in Section 4.0.

2.2.3 Wear aging to qualify the elastomer diaphragm for the service life limitations, as specified in Section 4.0. The wear aging test shall include the effects of pressure, temperature, and cycles, simultaneously.

2.3 Each size diaphragm shall be subjected to a baseline life cycle test at a pressure and temperature established by the valve manufacturer. This test data will be used to establish acceptance criteria for the production lot cyclic test specified in Section 3.1.4.

2.4 Thermal aging and wear testing conducted at two different pressure/temperature combinations may be used to qualify the diaphragm for all conditions enveloped by the two points with equal or less radiation exposure.

### 3. PRODUCTION REQUIREMENTS

3.1 To verify that production diaphragms are equivalent to diaphragms qualified by the procedures for Section 2.0, the following minimum requirements shall be met:

3.1.1 Certification of compound by Certificate of Compliance from the diaphragm manufacturer for each batch.

3.1.2 Verification of tensile strength, modulus, and elongation properties for each batch of the elastomer compound, as per ASTM D412.