

MSS SP-100-2020

Qualification Requirements for Elastomer Diaphragms for Nuclear Service Diaphragm Valves

Standard Practice
Developed and Approved by the
Manufacturers Standardization Society of the
Valve and Fittings Industry, Inc.
127 Park Street, NE
Vienna, Virginia 22180-4602
Phone: (703) 281-6613
Fax: (703) 281-6671
E-mail: standards@msshq.org



www.msshq.org

This MSS Standard Practice was developed under the consensus of the MSS Technical Committee 406, *Diaphragm Valves*, and the MSS Coordinating Committee. The content of this Standard Practice is the resulting efforts of knowledgeable and experienced volunteers to provide an effective, clear, and non-exclusive standard that will benefit the industry as a whole. This MSS Standard Practice describes minimal requirements and is intended as a basis for common practice by the manufacturer, the user, and the industry at large. It is the responsibility of the user of this Standard Practice to establish appropriate safety and health practices and determine the applicability of regulatory requirements prior to use. The existence of an MSS Standard Practice does not in itself preclude the manufacture, sale, or use of products not conforming to the Standard Practice. Mandatory conformance to this Standard Practice is established only by reference in other documents such as a code, specification, sales contract, or public law, as applicable. MSS has no power, nor does it undertake, to enforce or certify compliance with this document. Any certification or other statement of compliance with the requirements of this Standard Practice shall not be attributable to MSS and is solely the responsibility of the certifier or maker of the statement.

“Unless indicated otherwise within this MSS Standard Practice, other standards documents referenced to herein are identified by the date of issue that was applicable to this Standard Practice at the date of approval of this MSS Standard Practice (see Annex A). This Standard Practice shall remain silent on the validity of those other standards of prior or subsequent dates of issue even though applicable provisions may not have changed.”

By publication of this Standard Practice, no position is taken with respect to the validity of any potential claim(s) or of any patent rights in connection therewith. MSS shall not be held responsible for identifying any patent rights. Users are expressly advised that determination of patent rights and the risk of infringement of such rights are entirely their responsibility.

For all MSS Standard Practices, the term “shall” means “must” and “shall not” means “must not”.

In this Standard Practice, all text, notes, annexes, tables, figures, and references are construed to be “normative” and essential to understand the standard’s message. All appendices, footnotes, or other information denoted as “supplemental”, that may be included within this Standard Practice, DO NOT include mandatory or normative requirements.

Substantive changes in this 2020 edition are “flagged” by parallel bars as shown on the margins of this paragraph. The specific detail of the change may be determined by comparing the material flagged with that in the previous 2015 edition.

Excerpts of this Standard Practice may be quoted with written permission. Credit lines should read ‘Extracted from MSS SP-100-2020 with permission of the publisher, Manufacturers Standardization Society of the Valve and Fittings Industry’. Reproduction and/or electronic transmission or dissemination is prohibited under copyright convention unless written permission is granted by the Manufacturers Standardization Society of the Valve and Fittings Industry Inc. All rights reserved.

Originally Approved: June 1988

Originally Published: September 1988

Current Edition Approved: November 2020

Current Edition Published: December 2020

MSS is a registered trademark of the Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.

Copyright ©, 2020 by
Manufacturers Standardization Society
of the
Valve and Fittings Industry, Inc.

Printed in U.S.A.

This Page Intentionally Left Blank

Manufacturers Standardization Society of the Valve and Fittings Industry

TABLE OF CONTENTS

SECTION

1	SCOPE	1
2	QUALIFICATION	1
3	PRODUCTION REQUIREMENTS	1
4	SERVICE LIMITATIONS	2
5	MARKING	2
6	DOCUMENTATION	2

ANNEX

A	Referenced Standards and Applicable Dates	3
---	---	---

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 Class 2 and 3 diaphragm valves applicable to Section III of the ASME Boiler and Pressure Vessel Code (BPVC). 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, "*Terminology for Valves, Fittings, and Their Related Components*" 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.