Bracing for Piping Systems:
Seismic – Wind – Dynamic
Design, Selection, and Application

Note: This 2014a Edition Replaces
the Original 2014 Edition.
This MSS Standard Practice was developed under the consensus of the MSS Technical Committee 403 and the MSS Coordinating Committee. The content of this Standard Practice is the resulting efforts of competent 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 general public. 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 E). 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.

In this Standard Practice, all text, notes, annexes, tables, figures, and references are construed to be essential to the understanding of the message of the standard, and are considered normative unless indicated as “supplemental”. All appendices, if included, that appear in this document are construed as “supplemental”. Note that supplemental information does not include mandatory requirements.

U.S. customary units in this Standard Practice are the standard; the (SI) metric units are for reference only.

**This Standard Practice has been substantially revised from the previous 2001 edition. It is suggested that if the user is interested in knowing what changes have been made, that direct page by page comparison should be made of this document and that of the previous edition.**

Non-toleranced dimensions in this Standard Practice are nominal unless otherwise specified.

*Excerpts of this Standard Practice may be quoted with permission. Credit lines should read 'Extracted from MSS SP-127-2014a 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: February 2001
Originally Published: May 2001
Current Edition Approved: July 2013
Current Edition Published: February 2014

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

Copyright © 2014 by
Manufacturers Standardization Society
of the
Valve and Fittings Industry, Inc.
Printed in U.S.A.
FOREWORD

This Standard Practice was developed by representatives from pipe hanger manufacturers that are MSS member companies in good standing. It is constructed based on analysis, the current practice at the time, and on the collective feedback and experience of the industry. This Standard Practice is intended for use with non-critical, standard commercial and industrial systems. There is a companion Standard Practice, ANSI/MSS SP-58, which relates to the materials, design, manufacture, selection, application, and installation of pipe hangers and supports.
TABLE OF CONTENTS

SECTION                                      PAGE

1 SCOPE ................................................................. 1
2 OBJECTIVE .......................................................... 1
3 APPLICATION .................................................... 1
4 GENERAL REQUIREMENTS ....................................... 2
5 SELECTION PROCEDURE – SINGLE PIPES ..................... 4
6 SELECTION PROCEDURE – TRAPEZE HANGERS .................. 4
7 PIPE BRACING DRAWINGS .......................................... 5
8 INSTALLATION ...................................................... 6
9 INSPECTION ........................................................ 6
10 SPECIAL BRACE TYPES ............................................. 6

TABLE

1 Maximum Span for Lateral Braces and Seismic Design Force ......................................................... 7
1M Maximum Span for Lateral Braces and Seismic Design Force – (SI) Metric Units ............................... 8
2 Maximum Span for Lateral Braces and Wind Design Force ............................................................... 9
2M Maximum Span for Lateral Braces and Wind Design Force – (SI) Metric Units ................................. 10
3 Fasteners: Load Data for Bolts ........................................................................................................... 11
3M Fasteners: Load Data for (SI) Metric Bolts .................................................................................... 11
3.1 Fasteners: Load Data for Expansion Bolts in Concrete .............................................................. 12
3.2 Fasteners: Load Data for Embedded Bolts Cast in Concrete ........................................................ 12
3.3 Fasteners: Load Data for Lag Bolts or Lag Screws in Wood ......................................................... 13
4 Minimum Design Load Ratings for Brace Assemblies ................................................................. 13

FIGURE

1 Cable (Wire Rope) Brace Requirements ............................................................... 14
2 Typical Brace Members and Allowable Loads .............................................................. 15
2M Typical Brace Members and Allowable Loads – (SI) Metric Units .............................. 16
3 Typical Brace and Pipe Hanger Attachments .............................................................. 17
4 Typical Structural Attachments ....................................................................................... 18
5 Typical Rod Stiffener Components .................................................................................... 19
6 Pipe Supports that Also Act as Braces .............................................................................. 20

ANNEX

A Calculating Loads on Rods and Braces for Braced Hangers ................................................. 21
B Example of Brace Assembly Drawing .................................................................................... 26
C Graphical Solution – Maximum Span for Lateral Braces and Wind Design Force ............... 27
CM Graphical Solution – Maximum Span for Lateral Braces and Wind Design Force – (SI) Metric 28
D Examples of Determining Lateral Brace Requirements for Seismic and Wind Loads .......... 29
E Referenced Standards and Applicable Dates ........................................................................ 32

This is a preview of "MSS SP-127-2014a". Click here to purchase the full version from the ANSI store.
This Page Intentionally Left Blank

Manufacturers Standardization Society of the Valve and Fittings Industry
1. **SCOPE**

1.1 This Standard Practice establishes the material, design, fabrication, and inspection criteria to be used in the manufacture, selection, and application of standard types of bracing assemblies.

1.2 This Standard Practice presents recommended guidelines for providing stability in piping systems for protection against seismic, wind, and other dynamic forces.

1.3 This Standard Practice is intended for use on piping systems where formal engineered bracing design may not have been performed. Note that local and/or national building codes or regulations may supersede or augment these requirements.

1.4 This Standard Practice applies to rigidly connected metallic pipe only (welded, flanged, mechanical-jointed, etc.). For other types of pipe and pipe connections, contact the applicable pipe manufacturer for information.

2. **OBJECTIVE**

2.1 To serve as a bracing standard, that includes selection and application, for seismic, wind, and other dynamic forces. This Standard Practice can be referenced in whole or in part if so designated.

2.2 To serve as a guide to proven industry practice during engineering design and writing of job specifications covering seismic, wind, and other dynamic bracing of piping systems.

2.3 To provide the erector with information on types of seismic, wind, and other dynamic bracing to be used for specific applications and installations, where such information is not already provided.

2.4 To serve as a companion document to ANSI/MSS SP-58. ANSI/MSS SP-58 also provides definitions used in this Standard Practice.

3. **APPLICATION**

3.1 All piping systems subjected to seismic loading shall be braced for seismic forces in accordance with the requirements of this Standard Practice, unless otherwise defined in local and/or national building codes or regulations.

3.1.1 The charts below identify which size pipes require bracing for designated seismic design categories and importance factors.

### Pipe Bracing

<table>
<thead>
<tr>
<th>Seismic Design Category (SDC)</th>
<th>A, B</th>
<th>C</th>
<th>D, E, F</th>
</tr>
</thead>
<tbody>
<tr>
<td>I&lt;sub&gt;p&lt;/sub&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.0</td>
<td>Not Required</td>
<td>Not Required</td>
<td>NPS 3½ and Larger</td>
</tr>
<tr>
<td>1.5</td>
<td>Not Required</td>
<td>NPS 2½ and Larger</td>
<td>NPS 1½ and Larger</td>
</tr>
</tbody>
</table>

(Source: ASCE 7, Section 13.6.8; with additional exemptions from Section 13.1.4)

### Trapeze Supported Pipe Bracing

<table>
<thead>
<tr>
<th>Seismic Design Category (SDC)</th>
<th>A, B</th>
<th>C</th>
<th>D, E, F</th>
</tr>
</thead>
<tbody>
<tr>
<td>I&lt;sub&gt;p&lt;/sub&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.0</td>
<td>Not Required</td>
<td>Not Required</td>
<td>**10 lbs./ft. and Greater</td>
</tr>
<tr>
<td>1.5</td>
<td>Not Required</td>
<td>*10 lbs./ft. and Greater</td>
<td>***10 lbs./ft. and Greater</td>
</tr>
</tbody>
</table>

(Source: ASCE 7, Section 13.6.8; with additional exemptions from Section 13.1.4)

**NOTES:**

* Required if any pipe is NPS 2½ and larger.
** Required if any pipe is NPS 3½ and larger.
*** Required if any pipe is NPS 1½ and larger.

3.1.2 The Seismic Design Category (SDC) and Component Importance Factor (I<sub>p</sub>) are typically found on the project structural drawings or the project specifications. In general, the Engineer of Record determines these parameters.

3.1.3 Seismic Design Category (SDC) is a classification assigned to a structure based on its Occupancy Category and the severity of the design earthquake ground motion at the site, as defined in Chapter 11 of ASCE 7.