Committee Personnel

The Steel Water Pipe Manufacturers Technical Advisory Committee (SWPMTAC) Task Force for Development and Maintenance of ANSI/AWWA C604, which revised this standard, had the following personnel at the time:

Nash Williams, Chair

S.A. Arnaout, Forterra, Dallas, Texas (AWWA)
H.H. Bardakjian, Consultant, Glendale, Calif. (AWWA)
J. Buratto, Lifelast Inc., Austin, Texas (AWWA)
R.J. Card, Consultant, Sugar Hill, Ga. (AWWA)
D. Dechant, Consultant, Aurora, Colo. (AWWA)
J. Forini, Jifco Inc., Livermore, Calif. (AWWA)
B. Hansen, National Welding Corporation, Midvale, Utah (AWWA)
B. Keil, Northwest Pipe Company, Draper, Utah (AWWA)
D. Lay, Hytorc, Highland, Utah (AWWA)
D. Libby, Chase Corporation, Westwood, Mass. (AWWA)
J.L. Luka, American SpiralWeld Pipe Company, Columbia, S.C. (AWWA)
R. Mielke, Northwest Pipe Company, Raleigh, N.C. (AWWA)
J. Olmos, Ameron International, Rancho Cucamonga, Calif. (AWWA)
R.N. Satyarthi, Baker Coupling Company Inc., Los Angeles, Calif. (AWWA)
C. Shelley, Victaulic Company, Atlanta, Ga. (AWWA)
N. Williams, National Welding Corporation, Midvale, Utah (AWWA)

The Standards Committee on Steel Pipe, which reviewed and approved this standard, had the following personnel at the time of approval:

John H. Bambei Jr., Chair
Dennis Dechant, Vice-Chair
John L. Luka, Secretary

General Interest Members

W.R. Brunzell, Brunzell Associates Ltd., Skokie, Ill. (AWWA)
R.L. Coffey, HDR Engineering Inc., Omaha, Neb. (AWWA)
S.N. Foellmi, Black & Veatch Corporation, Irvine, Calif. (AWWA)
R.L. Gibson, Freese and Nichols Inc., Fort Worth, Texas (AWWA)
M.D. Gossett,* HDR, Denver, Colo. (AWWA)
M.B. Horsley,* Black & Veatch Corporation, Kansas City, Mo. (AWWA)
R.A. Kuafas, Norske Corrosion & Inspection Services Ltd., Surrey, B.C., Canada (AWWA)
J.L. Mattson, Corrosion Control Technologies, Sandy, Utah (AWWA)
A. Murdock, CH2M, Salt Lake City, Utah (AWWA)
R. Ortega,* Consultant, Spring, Texas (AWWA)
E.S. Ralph,† Standards Engineer Liaison, AWWA, Denver, Colo. (AWWA)
A.E. Romer, AECOM, Orange, Calif. (AWWA)
J.R. Snow, MWH Americas, Denver, Colo. (AWWA)
W.R. Whidden, Woolpert, Winter Park, Fla. (AWWA)

Producer Members

D.W. Angell,† Standards Council Liaison, American Flow Control, Birmingham, Ala. (AWWA)
S.A. Arnaout, Forterra, Dallas, Texas (AWWA)
H.H. Bardakjian, Consultant, Glendale, Calif. (AWWA)
D. Dechant, Dechant Infrastructure Service, Aurora, Colo. (AWWA)
V. DeGrande,* Ameron Water Transmission Group, Rancho Cucamonga, Calif. (AWWA)
W.B. Geyer, Steel Plate Fabricators Association, Lake Zurich, Ill. (SPFA)
B.D. Keil, Northwest Pipe Company, Draper, Utah (AWWA)
J.L. Luka, American SpiralWeld Pipe Company, Columbia, S.C. (AWWA)
R.D. Mielke,* Northwest Pipe Company, Raleigh, N.C. (AWWA)
J. Olmos, Ameron Water Transmission Group, Rancho Cucamonga, Calif. (AWWA)
G.F. Ruchti,* Consultant, Punta Gorda, Fla. (SFPA)
B. Simpson,* American Cast Iron Pipe Company, Birmingham, Ala. (AWWA)
C.C. Sundberg, Victaulic, Issaquah, Wash. (AWWA)
D. Walker, Avid Protective Products Ltd/ TNEMEC Company, Oakville, Ont., Canada (AWWA)
J.A. Wise, Canus International Sales Inc., Surrey, B.C., Canada (AWWA)

User Members

G.A. Andersen, New York City Bureau of Water Supply, Little Neck, N.Y. (AWWA)
J.H. Bambe Jr., Bambe Engineering Services, Arvada, Colo. (AWWA)

* Alternate
† Liaison, nonvoting
B. Cheng, Metro Vancouver, Burnaby, B.C., Canada  (AWWA)
M.E. Conner, San Diego County Water Authority, San Diego, Calif.  (AWWA)
R.V. Frisz, US Bureau of Reclamation, Denver, Colo.  (BUREC)
S. Hattan, Tarrant Regional Water District, Ft. Worth, Texas  (AWWA)
T.J. Jordan,* Metropolitan Water District of Southern California, La Verne, Calif.  (AWWA)
P.K. Karna, Tacoma Water, Tacoma, Wash.  (AWWA)
M. McReynolds, Metropolitan Water District of Southern California, Oak Park, Calif.  (AWWA)
M. Turney,* Denver Water, Denver, Colo.  (AWWA)
N.A. Wigner, Los Angeles Department of Water and Power, Los Angeles, Calif.  (AWWA)

* Alternate
## Contents

All AWWA standards follow the general format indicated subsequently. Some variations from this format may be found in a particular standard.

<table>
<thead>
<tr>
<th>SEC.</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreword</td>
<td></td>
</tr>
<tr>
<td>I Introduction......................... ix</td>
<td>5 Trench Construction</td>
</tr>
<tr>
<td>I.A History............................ ix</td>
<td>5.1 Alignment and Grade............... 7</td>
</tr>
<tr>
<td>I.B Discussion.......................... ix</td>
<td>5.2 Trench Construction............... 8</td>
</tr>
<tr>
<td>I.C Acceptance.......................... ix</td>
<td></td>
</tr>
<tr>
<td>II Special Issues..................... xi</td>
<td>6 Pipe Installation</td>
</tr>
<tr>
<td>II.A Application........................ xi</td>
<td>6.1 General Pipe Installation......... 10</td>
</tr>
<tr>
<td>II.B Chlorine and Chloramine Degradation of Elastomers ...... xi</td>
<td>6.2 Joint Assembly and Testing......... 11</td>
</tr>
<tr>
<td>III Use of This Standard............ xi</td>
<td>6.3 Thrust Restraint .................. 28</td>
</tr>
<tr>
<td>III.A Purchaser Options and Alternatives ...................... xi</td>
<td>6.4 Backfilling ......................... 28</td>
</tr>
<tr>
<td>III.B Modification to Standard....... xii</td>
<td>6.5 Flushing ........................... 31</td>
</tr>
<tr>
<td>IV Major Revisions.................. xii</td>
<td>6.6 Disinfection ....................... 31</td>
</tr>
<tr>
<td>V Comments ....................... xiii</td>
<td>6.7 Highway and Railroad Crossings .... 32</td>
</tr>
<tr>
<td>5 Trench Construction ................</td>
<td>6.8 Subaqueous Crossings............. 32</td>
</tr>
<tr>
<td>6 Pipe Installation ..................</td>
<td></td>
</tr>
<tr>
<td>7 Verification ........................</td>
<td></td>
</tr>
<tr>
<td>8 Delivery ................................</td>
<td></td>
</tr>
<tr>
<td>8.1 Unloading, Handling, and Storage..</td>
<td></td>
</tr>
<tr>
<td>8.2 Affidavit of Compliance ..........</td>
<td></td>
</tr>
<tr>
<td>Appendix ................................</td>
<td></td>
</tr>
<tr>
<td>A Flange Joint Assembly ...........</td>
<td></td>
</tr>
<tr>
<td>A.1 General Flange Joint Assembly Procedures and Checklists........ 37</td>
<td></td>
</tr>
<tr>
<td>A.2 Flanges, Fasteners, and Gaskets (Additional Details)............ 41</td>
<td></td>
</tr>
<tr>
<td>A.3 Bolting Patterns and Sequences .....</td>
<td></td>
</tr>
</tbody>
</table>

Copyright © 2017 American Water Works Association. All Rights Reserved.
Figures
1 Typical O-Ring Gasket Assembly.... 12
2 Typical Installation of Pipe    
   with Gasketed Bell-and-Spigot    
   Joints................................. 13
3 Joint Deflection...................... 14
4 Typical Installation of Pipe    
   with Welded Bell-and-Spigot    
   Joints................................. 16
5 Flat-Face Slip-on Ring Flange with    
   Fillet Weld Detail............... 18
6 Gasket Types.......................... 20
7 Trench Cross Section................. 30
A.1 Legacy Pattern—48-Bolt Flange    
   Bolt Grouping Example......... 45
A.2 Quadrant/Circular Pattern    
   Example—Reduces Tool    
   Movement and Time vs    
   Legacy Pattern................. 45
A.3 Simultaneous Pattern Example—    
   Maintains Parallel Flanges    
   and Reduces Passes and Bolt    
   Interaction....................... 46
A.4 Simultaneous Pattern with Multiple    
   Tools Example..................... 47

Table
1 Soil Stiffness Categories.......... 30