Sway Bracing Calculation

For

Homewood Suites
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By

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Homewood Suites – Puyallup, W.A.

Earthquake Calculations for 4" standpipe

Refer to NFPA. 13(2016)

a. Brace shape and size (from Table 9.3.5.11.8(b)):
   1" Sch. 40 (l/r – 200)
   Angle from vertical = 45°- 90°
   Maximum horizontal load = 1310 lb.
   Allowable Load on Brace (from Table 9.3.5.2.3) = 1310/1.414 = 926 lb.

b. Lateral braces every 29' – meet piping at right angles
   Longitudinal braces every 29' – aligned with piping

c. Sprinkler system load

1. Load on lateral braces = F_{pw} = 196.43 lb.
   Using Sch. 10 pipe (Table A-9.3.5.9)
   29' of 4" x (11.78/2) = 170.81
   Add 15 % of load for fittings = 25.62
   Sprinkler system load, F_{pw} = 170.81 + 25.62 = 196.43
2. Load on longitudinal braces = F_{pw} = 196.43 lb.
   Using Sch. 10 pipe (Table A-9.3.5.9)
   29' of 4" x 5.89 = 170.81
   Add 15 % of load for fittings = 25.62
   Sprinkler system load, F_{pw} = 170.81 + 25.62 = 196.43

d. All expected loads are less than maximum loads permitted.

e. Fasteners will be 1/2" x 2-1/2" through bolts in wood. Method of attachment will be one of the following from NFPA. 13(2016), Table 9.3.5.12.2(l)
   Maximum load for (B) = 200 lb. Maximum load for (C) = 240 lb.
   Maximum load for (E) = 280 lb. Maximum load for (F) = 480 lb.
   Maximum load for (H) = 275 lb. Maximum load for (I) = 410 lb.

Result: for 4" standpipe

Maximum length of brace = 7'-0"
Lateral braces with no branch every 29' – meet piping at right angles
Longitudinal braces every 29' – aligned with piping

Homewood Suites – Puyallup, W.A.

Earthquake Calculations for 6" standpipe

Refer to NFPA. 13(2016)

a. Brace shape and size (from Table 9.3.5.11.8(b)):
   1" Sch. 40 (l/r – 200)
   Angle from vertical = 45°- 90°
   Maximum horizontal load = 1310 lb.
   Allowable Load on Brace (from Table 9.3.5.2.3) = 1310/1.414 = 926 lb.

b. Lateral braces every 15' – meet piping at right angles
   Longitudinal braces every 15' – aligned with piping

c. Sprinkler system load
1. Load on lateral braces = F_{pw} = 198.64 lb.
   Using Sch. 10 pipe (Table A-9.3.5.9)
   15' of 6" x 11.515 = 172.73
   Add 15 % of load for fittings = 25.91
   Sprinkler system load, F_{pw} = 172.73 + 25.91 = 198.64
2. Load on longitudinal braces = F_{pw} = 198.64 lb.
   Using Sch. 10 pipe (Table A-9.3.5.9)
   15' of 6" x 11.515 = 172.73
   Add 15 % of load for fittings = 25.91
   Sprinkler system load, F_{pw} = 172.73 + 25.91 = 198.64

d. All expected loads are less than maximum loads permitted.

e. Fasteners will be 1/2" x 2-1/2" through bolts in wood. Method of attachment will be one of the following from NFPA. 13(2016), Table 9.3.5.12.2(l)
   Maximum load for (B) = 200 lb. Maximum load for (C) = 240 lb.
   Maximum load for (E) = 280 lb. Maximum load for (F) = 480 lb.
   Maximum load for (H) = 275 lb. Maximum load for (I) = 410 lb.

Result: for 6" standpipe
   Maximum length of brace = 7'-0"
   Lateral braces with no branch every 15' – meet piping at right angles
   Longitudinal braces every 15' – aligned with piping

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Earthquake Calculations for 2-1/2" dry main

Refer to NFPA. 13(2016)

a. Brace shape and size (from Table 9.3.5.11.8(b)):
1" Sch. 40 (l/r – 200)
Angle from vertical = 45°- 90°
Maximum horizontal load = 1310 lb.
Allowable Load on Brace (from Table 9.3.5.2.3) = 1310/1.414 = 926 lb.

b. Lateral braces every 40' – meet piping at right angles
Longitudinal braces every 55' – aligned with piping

c. Sprinkler system load
1. Load on lateral braces = F_{pw} = 135.47 lb.
Using Sch. 10 pipe (Table A-9.3.5.9)
40' of 2.5" x 2.945 = 117.80
Add 15 % of load for fittings = 17.67
Sprinkler system load, F_{pw} = 117.80 + 17.67 = 135.47
2. Load on longitudinal braces = F_{pw} = 186.28 lb.
Using Sch. 10 pipe (Table A-9.3.5.9)
55' of 2.5" x 2.945 = 161.98
Add 15 % of load for fittings = 24.30
Sprinkler system load, F_{pw} = 161.98 + 24.30 = 186.28

d. All expected loads are less than maximum loads permitted.

e. Fasteners will be 1/2" x 2-1/2" through bolts in wood. Method of attachment will be one of the following from NFPA. 13(2016), Table 9.3.5.12.2(l)
Maximum load for (B) = 200 lb. Maximum load for (C) = 240 lb.
Maximum load for (E) = 280 lb. Maximum load for (F) = 480 lb.
Maximum load for (H) = 275 lb. Maximum load for (I) = 410 lb.

Result: for 6" standpipe
Maximum length of brace = 7'-0"
Lateral braces with no branch every 40' – meet piping at right angles
Longitudinal braces every 55' – aligned with piping

Homewood Suites – Puyallup, W.A.

Earthquake Calculations for 2" dry main

Refer to NFPA. 13(2016)

a. Brace shape and size (from Table 9.3.5.11.8(b)):
1" Sch. 40 (l/r – 200)
Angle from vertical = 45°- 90°
Maximum horizontal load = 1310 lb.
Allowable Load on Brace (from Table 9.3.5.2.3) = 1310/1.414 = 926 lb.

b. Lateral braces every 40' – meet piping at right angles
Longitudinal braces every 15' – aligned with piping

c. Sprinkler system load
1. Load on lateral braces = F_{pw} = 93.38 lb.
Using Sch. 10 pipe (Table A-9.3.5.9)
40' of 2" x 2.030 = 81.20
Add 15 % of load for fittings = 12.18
Sprinkler system load, F_{pw} = 81.20 + 12.18 = 93.38
2. Load on longitudinal braces = F_{pw} = 186.76 lb.
Using Sch. 10 pipe (Table A-9.3.5.9)
80' of 2" x 2.030 = 162.40
Add 15 % of load for fittings = 24.36
Sprinkler system load, F_{pw} = 162.40 + 24.36 = 186.76

d. All expected loads are less than maximum loads permitted.

e. Fasteners will be 1/2" x 2-1/2" through bolts in wood. Method of attachment will be one of the following from NFPA. 13(2016), Table 9.3.5.12.2(l)
Maximum load for (B) = 200 lb. Maximum load for (C) = 240 lb.
Maximum load for (E) = 280 lb. Maximum load for (F) = 480 lb.
Maximum load for (H) = 275 lb. Maximum load for (I) = 410 lb.

Result: for 6" standpipe
Maximum length of brace = 7'-0"
Lateral braces with no branch every 40' – meet piping at right angles
Longitudinal braces every 80' – aligned with piping

Homewood Suites – Puyallup, W.A.

Earthquake Calculations for 2" CPVC pipe

Refer to NFPA. 13(2016)

a. Brace shape and size (from Table 9.3.5.11.8(b)):
   1" Sch. 40 (l/r – 200)
   Angle from vertical = 45°- 90°
   Maximum horizontal load = 1310 lb.
   Allowable Load on Brace (from Table 9.3.5.2.3) = 1310/1.414 = 926 lb.

b. Longitudinal braces every 75' – aligned with piping

c. Sprinkler system load

1. Load on longitudinal braces = F_{pw} = 189.75 lb.
   Using Blazemaster pipe
   75' of 2" x 2.20 = 165.00
   Add 15 % of load for fittings = 24.75
   Sprinkler system load, F_{pw} = 165.00 + 24.75 = 189.75

d. All expected loads are less than maximum loads permitted.

e. Fasteners will be 1/2" x 2-1/2" through bolts in wood. Method of attachment will be one of the following from NFPA. 13(2016), Table 9.3.5.12.2(l)
   Maximum load for (B) = 200 lb. Maximum load for (C) = 240 lb.
   Maximum load for (E) = 280 lb. Maximum load for (F) = 480 lb.
   Maximum load for (H) = 275 lb. Maximum load for (I) = 410 lb.

Result: for 2" CPVC pipe

Maximum length of brace = 7'-0"
Longitudinal braces every 75' – aligned with piping