## VERTICAL BLADDER TANK Balanced Pressure Proportioning System <br> NPRO50 <br> - Reliable Foam System Requiring Only Water Power <br> - Perfect For Tight Spaces <br> ■ UL \& ULC Listed, ASME, National Board Registered <br> - Bladder-UL162 Approved, High Tensile Pressure Formed Seams <br> - Interior Strainers And Flow Path Devices <br> - Supplied With All Valves, Piping And Equipment Necessary For Operation <br> - Custom Designs Available

## Description

The Bladder Tank Proportioning System is a balanced pressure proportioning system, requiring no external power other than an adequate water supply. A bladder tank, with an appropriate proportioner(s), injects foam concentrate into the water supply of a fire protection system and automatically proportions over a wide range of flows and pressures.

The Bladder Tank Proportioning System employs water to pressurize the bladder and force foam concentrate to the ratio controller. The water supply simultaneously feeds the ratio controller and the bladder tank. As water flows through the ratio controller the level of pressure reduction increases, thereby affecting a corresponding pressure drop across the foam concentrate metering orifice. The corresponding pressure drop results in foam concentrate flow that is proportionate to the water flow through the ratio controller. As both the water and foam concentrate flow into a common reduced pressure area, it is necessary only to maintain identical water and foam concentrate pressures at the respective inlets of the ratio controller.

During operation, the water outside the bladder gradually displaces the foam concentrate inside causing the bladder to collapse until the supply is exhausted. The bladder tank may then be isolated and the system allowed to discharge water only. Since the bladder tank is pressurized, the bladder cannot be refilled during operation.

## Features

- Compatible with all foam concentrates
- Requires less floor space than horizontal tanks
- Bottom foam concentrate discharge keeps feed piping full, eliminating air pockets and preventing corrosion
- Permanently welded lifting lugs for safe tank movement and positioning


## Applications

Frequently used in aircraft hangars, loading racks, sprinkler systems, and offshore platforms.

## Technical Specifications

The National Foam bladder tank system shall be a complete self-contained proportioning system consisting of a bladder tank, ratio controller, and assembled piping. The bladder tank shall be an ASME code welded carbon steel pressure vessel with a working pressure of 175 psi (12 bar). The tank shall be supplied in the vertical configuration and shall be mounted on full skirt securely welded to tank shell, complete with four mounting clips. A flexible, thermoplastic vulcanized rubber internal bladder separates the foam concentrate from the incoming water. The bladder shall be manufactured with single piece nozzles and all seams shall be temperature/ pressure high tensile strength using no adhesives. The tank shall have slotted PVC schedule 80 center discharge piping, located within the bladder, to ensure that foam concentrate flows to the bottom discharge. A section of 1 -inch I.D. rubber hose installed between the bladder and tank shell, shall extend from the water vent to the

water drain connection, preventing bladder obstruction at these openings.

The ratio controller (RCF) shall be a flanged style for mounting in Schedule 40 pipe between two 150\# flat or raised flanges of the same nominal size as the RCF. The RCF shall be cast bronze with stainless steel hardware and shall be rated for a working pressure of 250 psi (17 bar). The ratio controller shall incorporate a recovery section to minimize the pressure loss through the proportioner and reduce the straight pipe length required after the controller. A $1 / 4^{\prime \prime}(6.35 \mathrm{~mm})$ female NPT port for sensing water pressure at the inlet to the ratio controller water orifice shall be incorporated into the casting. Each ratio controller shall automatically proportion over the range indicated on flow range chart without any manual adjustment. The foam concentrate inlet shall contain a foam concentrate metering orifice with field adjustment feature to allow user to fine tune proportioning.
The ratio controller shall be pre-piped to the bladder tank. All external piping shall be Schedule 40, and shall be brass for foam concentrate and carbon steel for water. Brass or bronze ball valves of the locking handle type, in accordance with NFPA requirements for valve supervision, shall be supplied, and shall be complete with identification labels on the handles. A ball check valve shall be installed in the foam concentrate line. Tank shall include all necessary drain and vent valves, concentrate fill piping, fill cup, and tank content/ identification labels. External surfaces of tank and piping shall be coated with red high solids acrylic polyurethane finish.

## VERTICAL BLADDER TANK

## Balanced Pressure Proportioning System

NPR050

## Approvals and Listings

■ Underwriters Laboratories, Inc. (UL Listed)
■ Underwriters Laboratories, Canada. (ULC Listed)

- ASME Section VIII Div 1


## Technical Information

Materials of Construction:
Tank: Carbon steel, ASME code Bladder: Welded seam thermoplastic Internal Piping:

Slotted PVC, Sch. 80
External Piping:
Water Side: Carbon Steel, Sch.
40, Screwed
Fm. Conc. Side: Brass, Sch. 40, Screwed

Valves:

Ball valve with locking handle, bronze body, and brass or chrome plated brass ball
Fill Funnel: Polyethylene, $71 / 2$ " diameter cup x 1" male NPT spout
Ratio Controller:
Cast Bronze (85-5-5-5), ASTM-B-584
alloy \#83600
Exterior Finish:
Red high solids acrylic polyurethane
(NF Spec AS1-06-030)
Working Pressure:
175 psi (12 bar)

## Options

- Sight gauge: $11 / 2^{\prime \prime}(38 \mathrm{~mm})$ O.D. polycarbonate with bronze ball shutoff valve
- Higher tank working pressures
- Coal tar epoxy internal coating
- Special finishes
- Pressure relief valve
- Type 304 or 316 stainless steel piping, screwed or welded
- Fill kit
- Automatic concentrate valve. Typically NF WPBV, also available as electrically or pneumatically actuated valve.
- Alternate style and multiple ratio controllers
- Reversed flow direction



| TABLE 1-RC DIMENSIONS |  |  |  |
| :---: | :---: | :---: | :---: |
| Assembly <br> w/Spool | "Q" | "R" | "S" |
| 3" RC | 19 | 4 | $4-1 / 2$ |
| 4" RC | 25 | $4-1 / 4$ | 7 |
| 6" RC | 27 | $5-1 / 4$ | $9-11 / 16$ |
| 8" RC | 31 | 7 | 10 |

## VERTICAL BLADDER TANK <br> Balanced Pressure Proportioning System

NPR050

| TABLE 2 - VALVE DESCRIPTION |  |  |  |
| :---: | :--- | :---: | :---: |
| Valve <br> No. | Description | Normal Position |  |
|  | Manual System |  |  | Auto. System.

TABLE 3 - SUGGESTED RATIO CONTROLLER SIZES FOR SYSTEM FLOWS

| Ratio Controller Size | * Standard Flow Range | * Special Flow Range with AR-AFFF \& 3\% AR-Synthetic | Water \& Concentrate Line Sizes in. (mm) | Ratio Controller Connections in. (mm) |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| in. (mm) | gpm (lpm) | gpm (lpm) |  | Inlet | Outlet |
| 2 (51) | 25-260 (95-984) | 60-260 (227-984) |  | $\begin{gathered} 2(51) \\ \text { NPT (F) } \end{gathered}$ | $\begin{gathered} 2(51) \\ \text { NPT (F) } \end{gathered}$ |
| 3 (76) | 70-730 (265-2763) | 185-730 (700-2763) | to be <br> Determined | $\begin{aligned} & 3 \text { (76) } \\ & \text { FF flg. } \end{aligned}$ | $3 \text { (76) }$ <br> FF flg. |
| 4 (102) | 60-1579 (227-5977) | 334-1483 (1264-5614) | by NF at System Design. | $\begin{gathered} 4 \text { (102) } \\ \text { FF flg. } \end{gathered}$ | $\begin{aligned} & 4(102) \\ & \text { FF flg. } \end{aligned}$ |
| 6 (152) | 150-3024 (568-11447) | 627-3024 (2373-11447) |  | $6(152)$ <br> FF flg. | $\begin{aligned} & 6(152) \\ & \text { FF flg. } \end{aligned}$ |
| 8 (203) | 760-5040 (2877-19078) | 1000-5004 (3785-18942) |  | $\begin{gathered} 8(203) \\ \text { FF flg. } \end{gathered}$ | $\begin{gathered} 8(203) \\ \text { FF flg. } \end{gathered}$ |

*Represents the overall flow range for all foam concentrates listed with respective ratio controller. Refer to UL directory for specific flow range for each foam concentrate.

## NOTES:

1. All dimensions are approximate and may vary slightly.
2. Weights listed apply to empty tanks.
3. All tank and valve openings will be plugged for shipping
4. Optional sight glass assembly includes:

- Polycarbonate sight glass tube, $11 / 2^{\prime \prime}(38)$ O.D. open to atmosphere (vented cap)
- Ball shutoff valve
- Split pipe clamp w/ threaded rod

5. Fill funnel and optional sight glass tube will be packed and shipped separately.
6. Optional sight glass level check cannot be performed with alcohol type AFFF concentrates. Refer to the operating and maintenance manual for further instructions.
7. Contents label will be supplied to customer by NF with foam concentrate order and applied by customer.
8. When designing a building to house bladder tanks, provisions must be to allow for the removal of the internal piping and bladder. These items are the full height of tank.
9. Concentrate vent valve \#5 will also be used to top off the concentrate level. A fill funnel will be provided with each tank for this purpose.
10. For non-standard or special tanks, refer to the tank's specific outline assembly drawing for details.
11. For tanks exceeding reasonable shipping crate sizes, piping will be supplied disassembled using grooved couplings for easy assembly at installation site.

# VERTICAL BLADDER TANK <br> Balanced Pressure Proportioning System 

NPR050
TABLE 2 - CAPACITY AND DIMENSIONS CHART

| Capacity gal. (liters) | " ${ }^{\prime \prime}$ | "B" | "C" | "D" | "E" | "F" | "G" | Empty Weight lb (kg) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 25 (95) | 20 (508) | 22 (559) | 46 (1168) | 22-3/4 (578) | 9/16 (14) | 4 (102) | 49 (1245) | 350 (159) |
| 36 (136) | 24 (610) | 24 (610) | 46 (1168) | 22-3/4 (578) | 9/16 (14) | 4 (102) | 50 (1270) | 420 (191) |
| 50 (189) | 24 (610) | 24 (610) | 46 (1168) | 22-3/4 (578) | 9/16 (14) | 4 (102) | 58 (1473) | 507 (230) |
| 100 (379) | 24 (610) | 24 (610) | 85 (2159) | 22-3/4 (578) | 9/16 (14) | 4 (102) | 87 (2210) | 665 (302) |
| 150 (568) | 30 (762) | 27 (686) | 82 (1561) | 27-3/4 (705) | 9/16 (14) | 4 (102) | 86 (2184) | 820 (372) |
| 200 (757) | 30 (762) | 27 (686) | 100 (2540) | 27-3/4 (705) | 9/16 (14) | 4 (102) | 104 (2642) | 957 (434) |
| 300 (1136) | 36 (914) | 30 (762) | 103 (2616) | 32-3/4 (832) | 9/16 (14) | 4 (102) | 108 (2743) | 1301 (591) |
| 400 (1514) | 48 (1219) | 36 (914) | 83 (2108) | 41-1/2 (1054) | 11/16 (17) | 4 (102) | 91 (2311) | 1704 (773) |
| 500 (1892) | 48 (1219) | 36 (914) | 97 (2464) | 41-1/2 (1054) | 11/16 (17) | 4 (102) | 105 (2667) | 1760 (799) |
| 600 (2271) | 48 (1219) | 36 (914) | 112 (2845) | 41-1/2 (1054) | 11/16 (17) | 4 (102) | 120 (3048) | 1869 (848) |
| 700 (2649) | 48 (1219) | 37-1/2 (953) | 126 (3200) | 41-1/2 (1054) | 11/16 (17) | 4 (102) | 134 (3404) | 2099 (953) |
| 750 (2839) | 48 (1219) | 37-1/2 (953) | 134 (3404) | 41-1/2 (1054) | 11/16 (17) | 4 (102) | 142 (3607) | 2200 (999) |
| 800 (3028) | 60 (1524) | 43-1/2 (1105) | 102 (2591) | 51-1/2 (1308) | 11/16 (17) | 8 (203) | 113 (2870) | 2304 (1046) |
| 900 (3407) | 60 (1524) | 43-1/2 (1105) | 110 (2794) | 51-1/2 (1308) | 11/16 (17) | 8 (203) | 122 (3099) | 2634 (1196) |
| 1000 (3785) | 60 (1524) | 43-1/2 (1105) | 120 (3048) | 51-1/2 (1308) | 13/16 (21) | 8 (203) | 132 (3353) | 3030 (1375) |
| 1100 (4164) | 60 (1524) | 43-1/2 (1105) | 130 (3302) | 51-1/2 (1308) | 13/16 (21) | 8 (203) | 141 (3581) | 4123 (1871) |
| 1200 (4542) | 60 (1524) | 43-1/2 (1105) | 140 (3556) | 51-1/2 (1308) | 13/16 (21) | 8 (203) | 150 (3810) | 3521 (1598) |
| 1300 (4921) | 60 (1524) | 43-1/2 (1105) | 150 (3810) | 51-1/2 (1308) | 13/16 (21) | 8 (203) | 160 (4064) | 3640 (1652) |
| 1400 (5300) | 60 (1524) | 43-1/2 (1105) | 158 (4013) | 51-1/2 (1308) | 13/16 (21) | 8 (203) | 169 (4293) | 3759 (1706) |
| 1500 (5678) | 60 (1524) | 43-1/2 (1105) | 167 (4242) | 51-1/2 (1308) | 13/16 (21) | 8 (203) | 178 (4521) | 3810 (1729) |
| 1600 (6057) | 72 (1829) | 49-1/2 (1257) | 134 (3404) | 57-1/2 (1461) | 13/16 (21) | 8 (203) | 144 (3658) | 3900 (1770) |
| 1700 (6435) | 72 (1829) | 49-1/2 (1257) | 140 (3556) | 57-1/2 (1461) | 13/16 (21) | 8 (203) | 150 (3810) | 4125 (1872) |
| 1800 (6814) | 72 (1829) | 49-1/2 (1257) | 147 (3734) | 57-1/2 (1461) | 13/16 (21) | 8 (203) | 157 (3988) | 4250 (1929) |
| 1900 (7192) | 72 (1829) | 49-1/2 (1257) | 153 (3886) | 57-1/2 (1461) | 13/16 (21) | 8 (203) | 163 (4140) | 4375 (1986) |
| 2000 (7571) | 72 (1829) | 49-1/2 (1257) | 160 (4064) | 57-1/2 (1461) | 13/16 (21) | 8 (203) | 170 (4318) | 4500 (2043) |
| 2100 (7949) | 72 (1829) | 49-1/2 (1257) | 166 (4216) | 57-1/2 (1461) | 13/16 (21) | 8 (203) | 176 (4470) | 4625 (2099) |
| 2200 (8328) | 72 (1829) | 49-1/2 (1257) | 173 (4394) | 57-1/2 (1461) | 13/16 (21) | 8 (203) | 183 (4648) | 4750 (2156) |
| 2300 (8706) | 72 (1829) | 49-1/2 (1257) | 179 (4547) | 57-1/2 (1461) | 13/16 (21) | 8 (203) | 189 (4801) | 4875 (2213) |
| 2400 (9085) | 72 (1829) | 49-1/2 (1257) | 186 (4724) | 57-1/2 (1461) | 13/16 (21) | 8 (203) | 196 (4978) | 5000 (2270) |

## VERTICAL BLADDER TANK <br> Balanced Pressure Proportioning System

NPR050

| Capacity |  | Part Number (with or without sight gauge) | Approx. Shipping Weight |  | Approx. Shipping Package Dimensions |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |  |  |  |
| gal. | liters |  | lb | kg | in. | mm | in. | mm | in. | mm |
| 25 | 95 |  | Tanks with prepiped ratio | 760 | 345 | 34 | 864 | 34 | 864 | 55 | 1397 |
| 36 | 136 | controllers are custom to | 770 | 350 | 36 | 914 | 36 | 914 | 56 | 1422 |
| 50 | 189 | customer request. | 800 | 363 | 36 | 914 | 36 | 914 | 64 | 1626 |
| 100 | 379 | Please contact | 950 | 431 | 93 | 2362 | 41 | 1041 | 50 | 1270 |
| 150 | 568 | National Foam Inc. for | 1095 | 497 | 92 | 2337 | 38 | 965 | 52 | 1321 |
| 200 | 757 | part numbers and pricing. | 1225 | 556 | 110 | 2794 | 38 | 965 | 52 | 1321 |
| 300 | 1136 |  | 2000 | 908 | 114 | 2896 | 43 | 1092 | 57 | 1448 |
| 400 | 1514 |  | 2200 | 999 | 97 | 2464 | 55 | 1397 | 69 | 1753 |
| 500 | 1892 |  | 2350 | 1067 | 109 | 2769 | 55 | 1397 | 69 | 1753 |
| 600 | 2271 |  | 2500 | 1135 | 124 | 3150 | 55 | 1397 | 69 | 1753 |
| 700 | 2649 |  | 2650 | 1203 | 138 | 3505 | 55 | 1397 | 69 | 1753 |
| 750 | 2839 |  | 2800 | 1271 | 146 | 3708 | 55 | 1397 | 69 | 1753 |
| 800 | 3028 |  | 2900 | 1316 | 119 | 3023 | 67 | 1702 | 82 | 2083 |
| 900 | 3407 |  | 3250 | 1475 | 128 | 3251 | 67 | 1702 | 82 | 2083 |
| 1000 | 3785 |  | 3600 | 1634 | 138 | 3505 | 67 | 1702 | 82 | 2083 |
| 1100 | 4164 |  | 3950 | 1793 | 147 | 3734 | 67 | 1702 | 82 | 2083 |
| 1200 | 4542 |  | 4300 | 1952 | 156 | 3962 | 67 | 1702 | 82 | 2083 |
| 1300 | 4921 |  | 4650 | 2111 | 166 | 4216 | 67 | 1702 | 82 | 2083 |
| 1400 | 5300 |  | 5000 | 2270 | 175 | 4445 | 67 | 1702 | 82 | 2083 |
| 1500 | 5678 |  | 5350 | 2428 | 184 | 4674 | 67 | 1702 | 82 | 2083 |
| 1600 | 6057 |  | 5550 | 2519 | 150 | 3810 | 79 | 2007 | 94 | 2388 |
| 1700 | 6435 |  | 5750 | 2610 | 156 | 3962 | 79 | 2007 | 94 | 2388 |
| 1800 | 6814 |  | 5950 | 2701 | 163 | 4140 | 79 | 2007 | 94 | 2388 |
| 1900 | 7192 |  | 6150 | 2791 | 169 | 4293 | 79 | 2007 | 94 | 2388 |
| 2000 | 7571 |  | 6350 | 2882 | 176 | 4470 | 79 | 2007 | 94 | 2388 |
| 2100 | 7949 |  | 6550 | 2973 | 182 | 4623 | 79 | 2007 | 94 | 2388 |
| 2200 | 8328 |  | 6750 | 3064 | 189 | 4801 | 79 | 2007 | 94 | 2388 |
| 2300 | 8706 |  | 6950 | 3155 | 195 | 4953 | 79 | 2007 | 94 | 2388 |
| 2400 | 9085 |  | 7150 | 3245 | 202 | 5131 | 79 | 2007 | 94 | 2388 |

# VERTICAL BLADDER TANK Balanced Pressure Proportioning System 

NPR050

