Fluorine Free Low Expansion Foam Systems (SFFF)

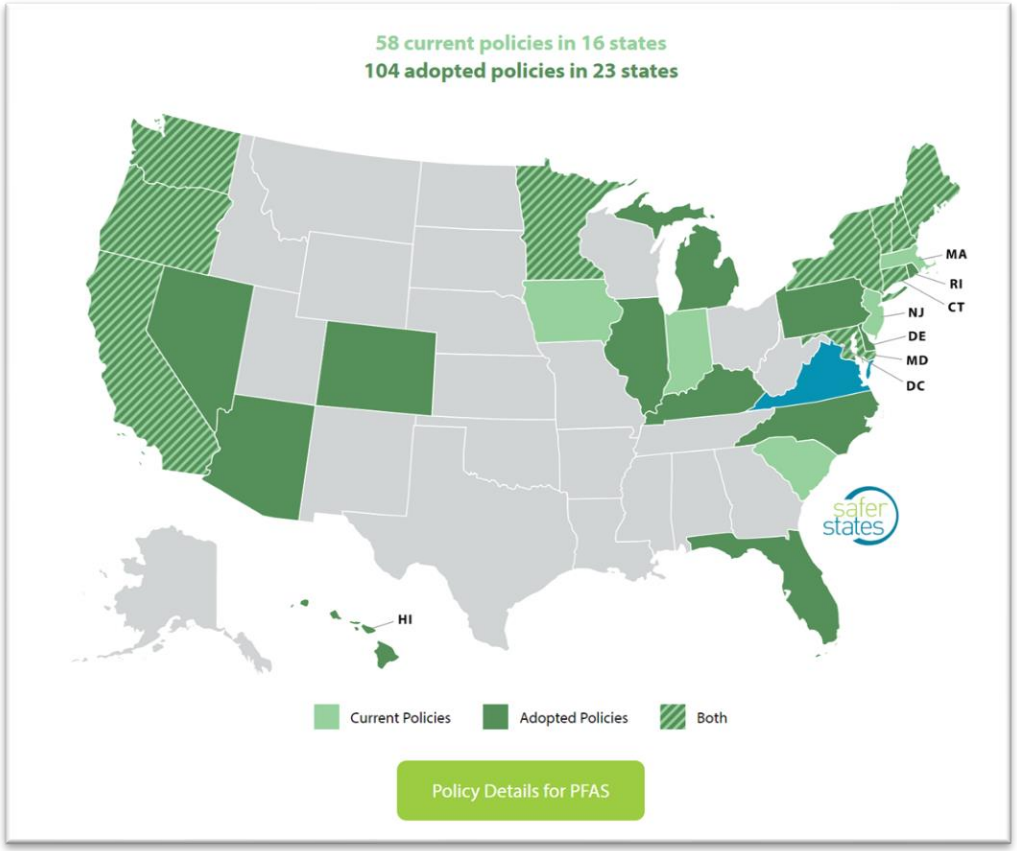
Presenter: Joshua Overholt

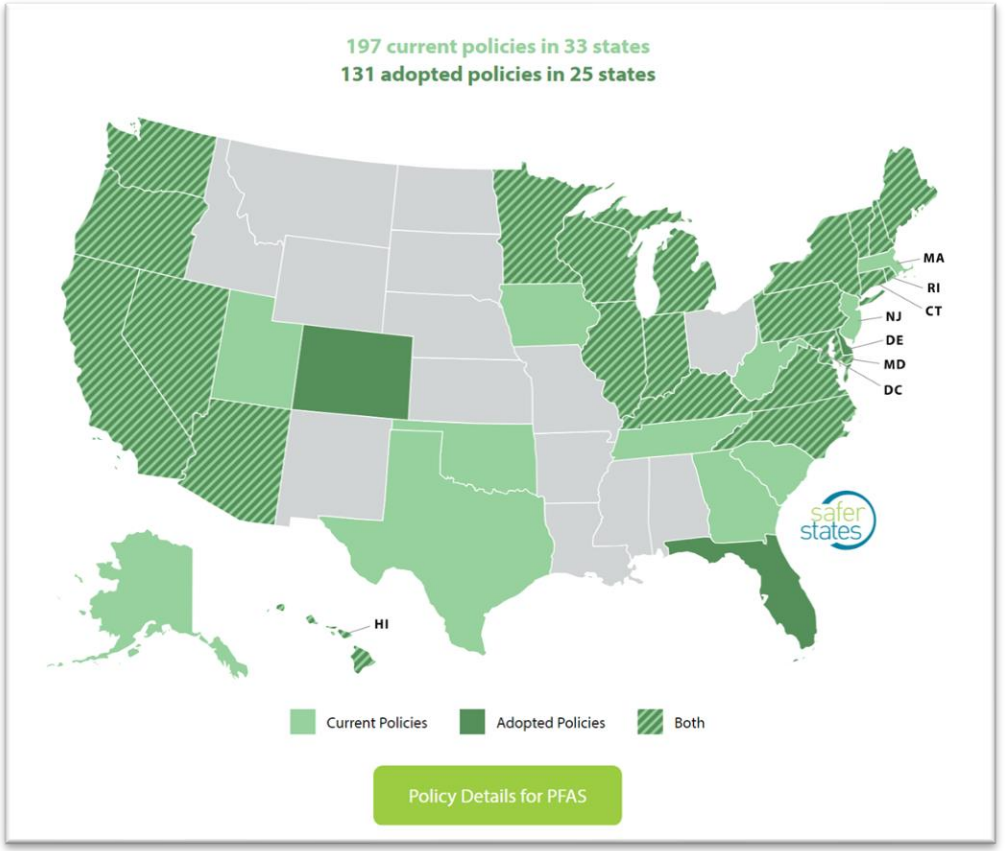
VIKING®

Trusted above all.™

Viking Fluorine Free Low Expansion Foam Systems (SFFF)

States Leading the way to Safer Chemicals

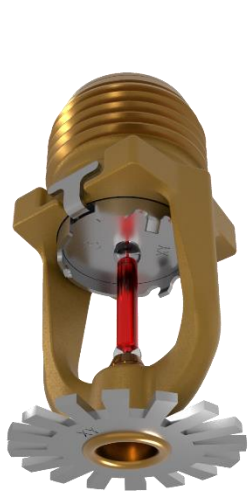




https://www.saferstates.com/toxic-chemicals/pfas/

Things we'll discuss

- Components of listed and approved systems
- The differences of foam concentrates
- Specific system considerations
- The importance of understanding application densities



Components of a listed or approved system

- Foam concentrate
- Bladder tank
- Proportioning method
- Discharge device(s)

Fluorine Free Low Expansion Foam Systems (SFFF)

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Fixed Extinguishing Systems | Foam | Foam Extinguishing Systems, Low Expansion

Low Expansion Foam Systems Using Viking USP Foam Concentrate

Product Description ▼

Foam Concentrates

Used as a component of foam systems. Concentrates are only Approved for use with the specific proportioning, bladder tank, foam water sprinklers, and discharge devices listed below.

Use of a concentrate with other devices or outside the listed ranges may result in solutions too lean or rich or may produce foam unable to provide the required extinguishing or sealing performance.

The concentrate listed below was evaluated for compatibility with fresh water only.

Product	Concentrate Type	Concentrate % in Water	Configuration	Approved Fuel Hazards
Viking USP	SFFF	3%	For use with Viking ratio controllers and bladder tanks specifically tested with this concentrate, pre-mixed solution, or other FM Approved proportioning methods within acceptable viscosity range only. For use with Viking discharge devices evaluated with the specific concentrate only.	Heptane, Jet A-1

GREEN - *Foam concentrate formulations are in accordance with the US EPA Stewardship Program 2010/15, EU Directive 2006/I22/EC, and amended Council Directive 76/769/EEC.*

Foam Concentrate Viscosity

The viscosity of non-Newtonian foam concentrates will vary depending on the fluid's flow velocity and resultant shear rate. As such, it is important to define this relationship and consider how the viscosity changes with shear rate. The following table provides viscosity vs. shear rate data for the subject concentrate throughout a range of given shear rates.

Shear Rate (1/s)	Viscosity @ 68°F (20°C) (Cp)

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Fluorine Free Low Expansion Foam Systems (SFFF)

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Fixed Extinguishing Systems | Foam | Foam Extinguishing Systems, Low Expansion

Low Expansion Foam Systems Using Viking USP Foam Concentrate

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Shear Rate (1/s)	Viscosity @ 68°F (20°C) (Cp)

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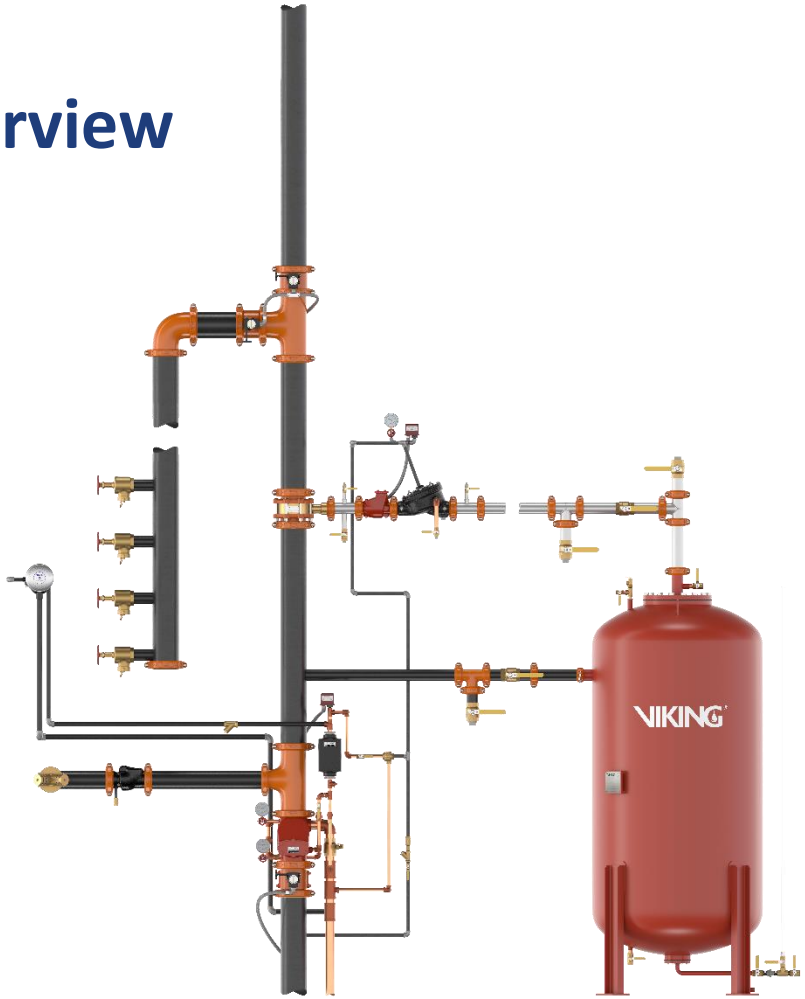
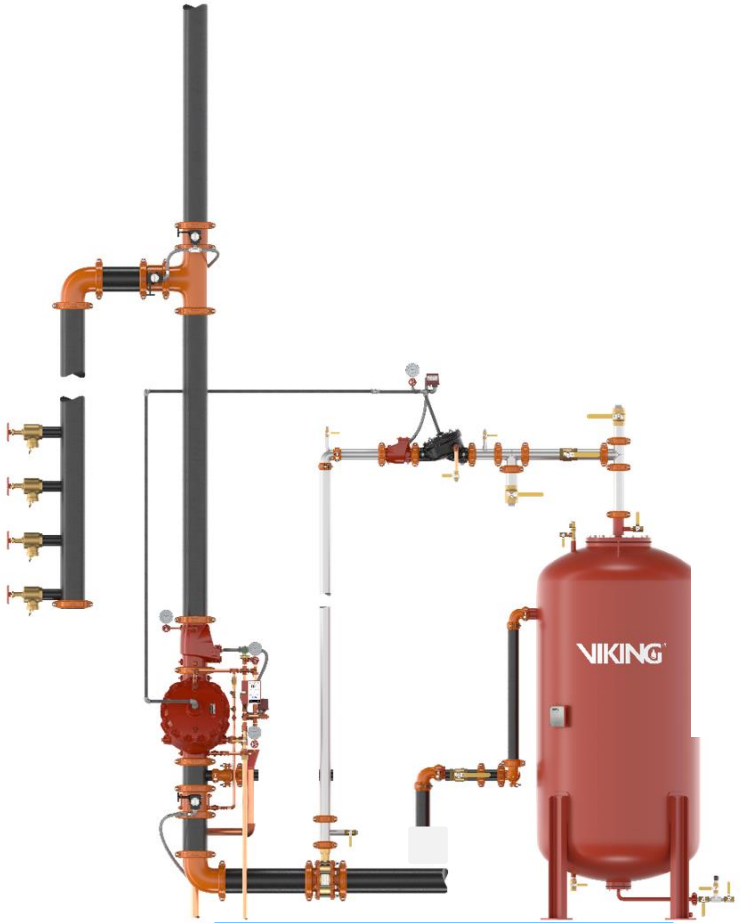
Fluorine Free Low Expansion Foam Systems (SFFF)

Systems Overview



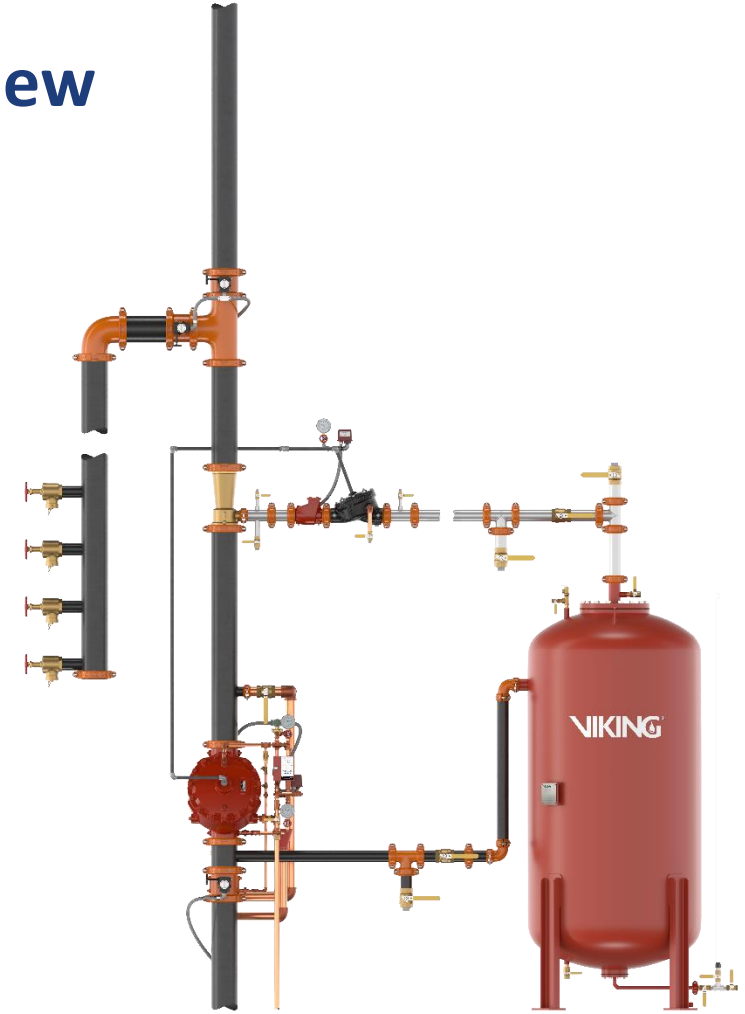
Wet Pipe Foam Water System



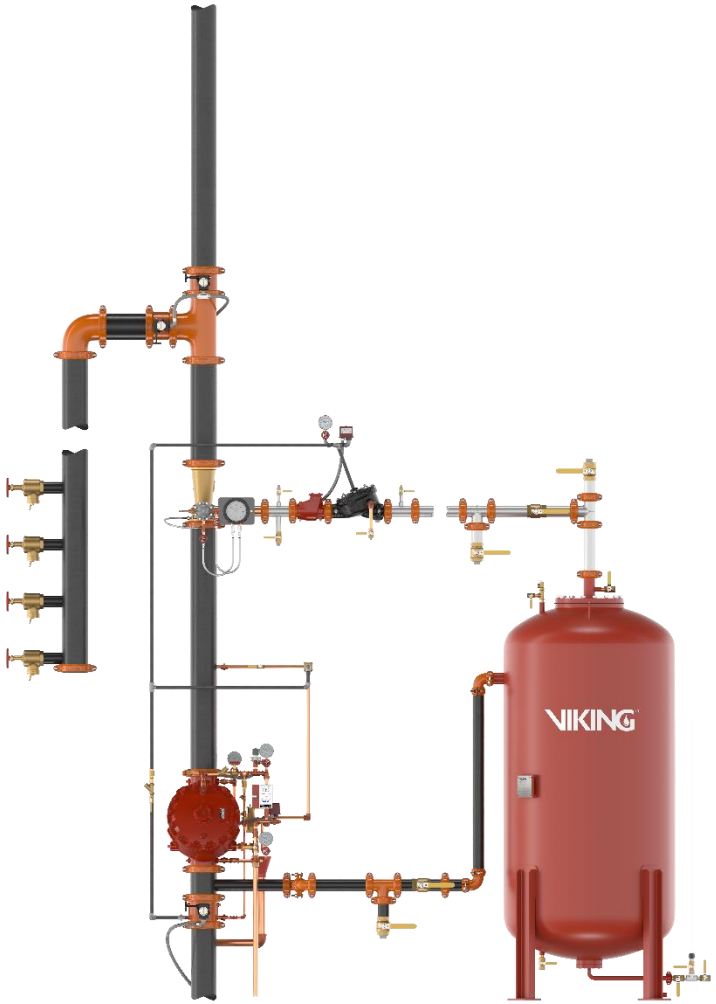
Preaction (SI) Foam Water System

Fluorine Free Low Expansion Foam Systems (SFFF)

Systems Overview



Deluge Foam Water System



Pressure Regulating Flow Control System

ARK Foam Concentrate

Alcohol Resistive

Product	Concentrate Type	Concentrate % in Water	Configuration	Approved Fuel Hazards
Viking ARK	AR-SFFF	3%	For use with Viking Corp. proportioners and bladder tanks specifically tested with this concentrate, pre-mixed solution, or other proportioning equipment approved for a range of viscosities and which is determined to be compatible with the concentrate specified in this listing. For use with discharge devices evaluated with the specific concentrate only.	Heptane, IPA, Acetone, Ethanol

* PFAS-free is defined as zero intentionally added PFAS to the product and PFAS contamination in the product must be less than 0.0001 percent by weight of the product (1 part per million) total organic fluorine as measured by combustion ion chromatography.

GREENSCREEN CERTIFIED SILVER FIREFIGHTING FOAM 2.1 VERSION 20221046 CERTIFICATE NUMBER cpa Clean Production Action

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USP Foam Concentrate

Hydrocarbons only

Product	Concentrate Type	Concentrate % in Water	Configuration	Approved Fuel Hazards
Viking USP	SFFF	3%	For use with Viking ratio controllers and bladder tanks specifically tested with this concentrate, pre-mixed solution, or other FM Approved proportioning methods within acceptable viscosity range only. For use with Viking discharge devices evaluated with the specific concentrate only.	Heptane, Jet A-1

* PFAS-free is defined as zero intentionally added PFAS to the product and PFAS contamination in the product must be less than 0.0001 percent by weight of the product (1 part per million) total organic fluorine as measured by combustion ion chromatography.

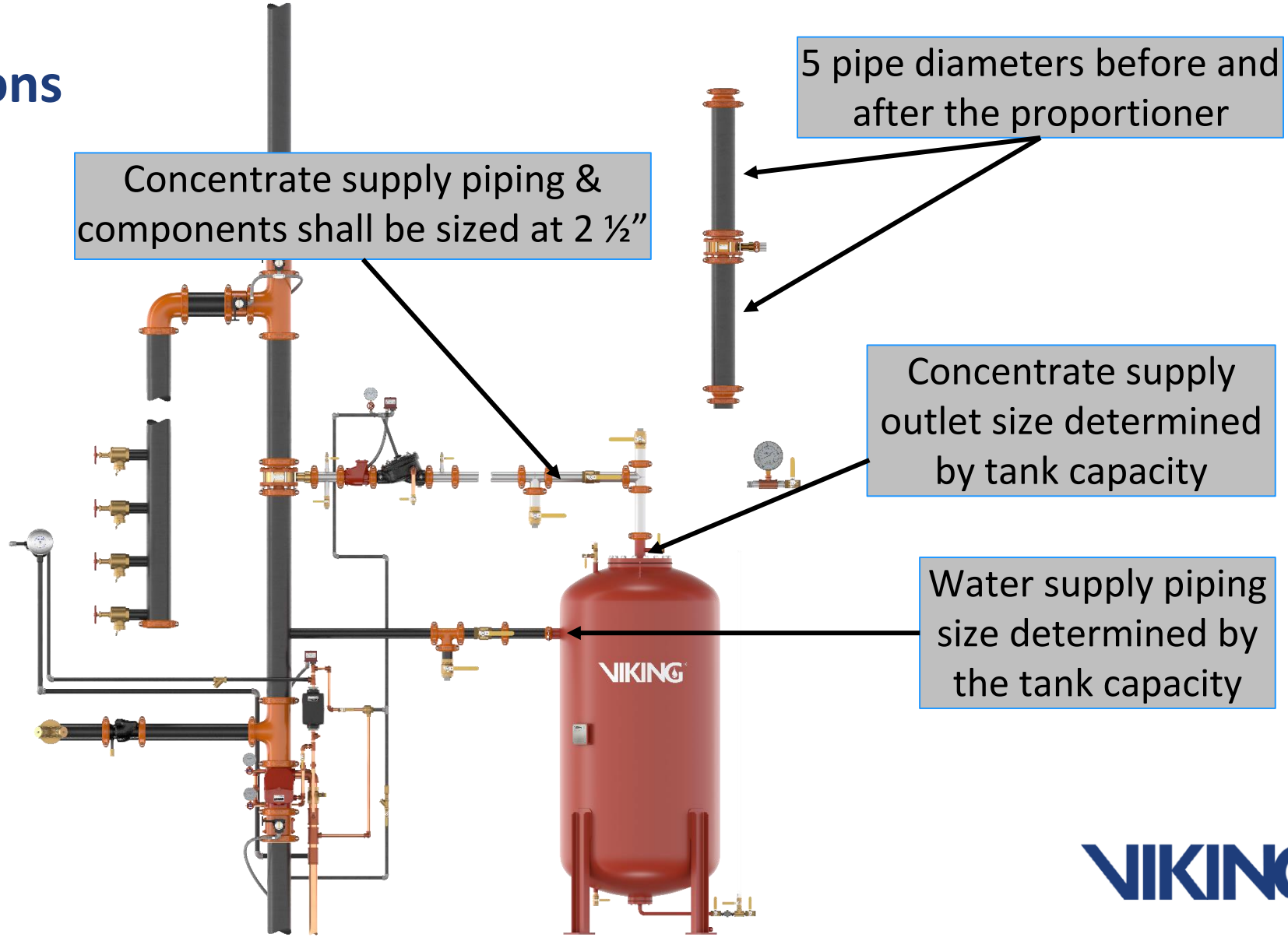
Foam Concentrates

Newtonian Fluids

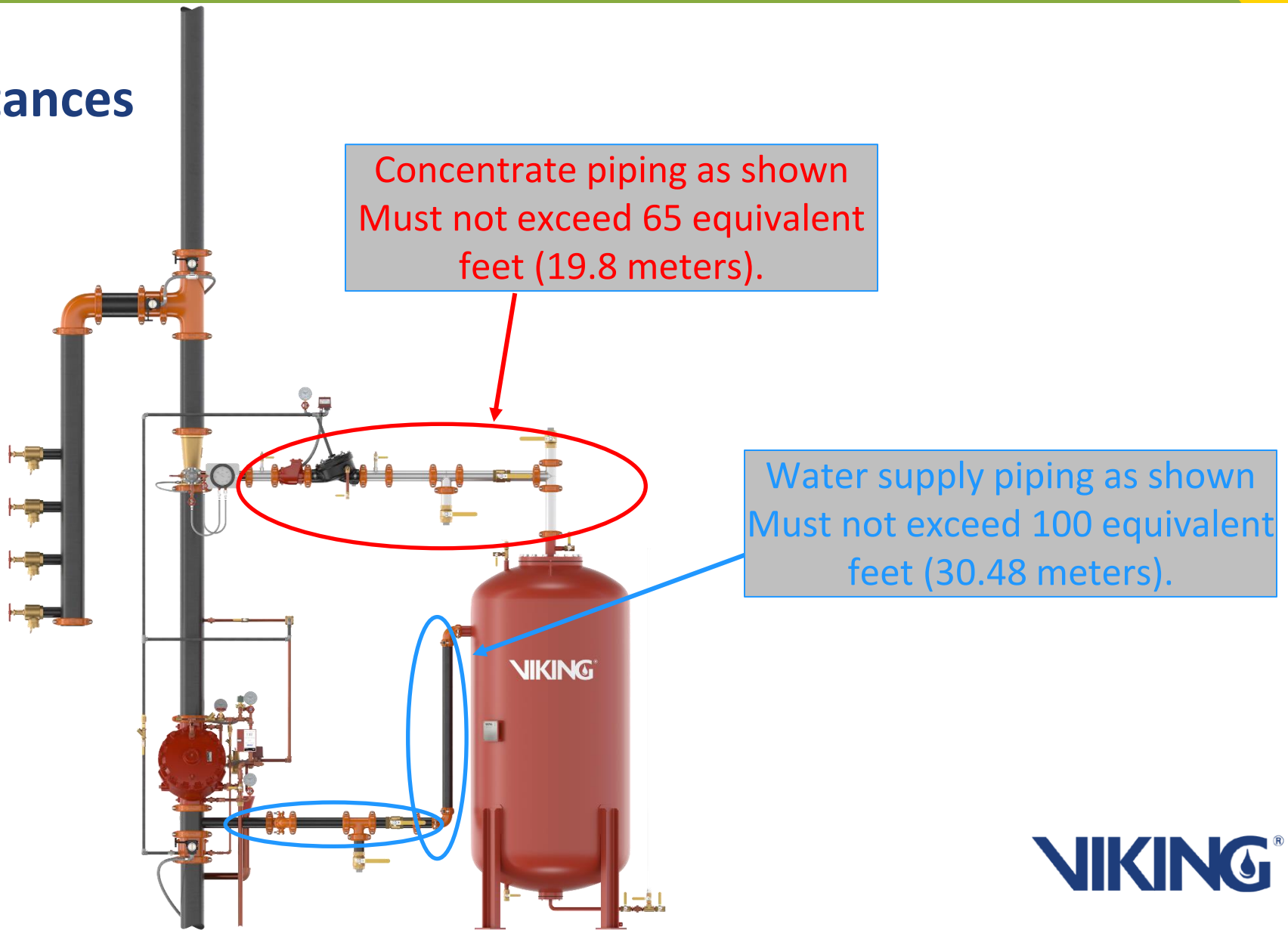
Foam Concentrates

Non-Newtonian Fluids

Specific Considerations



Pipe Equivalency Distances



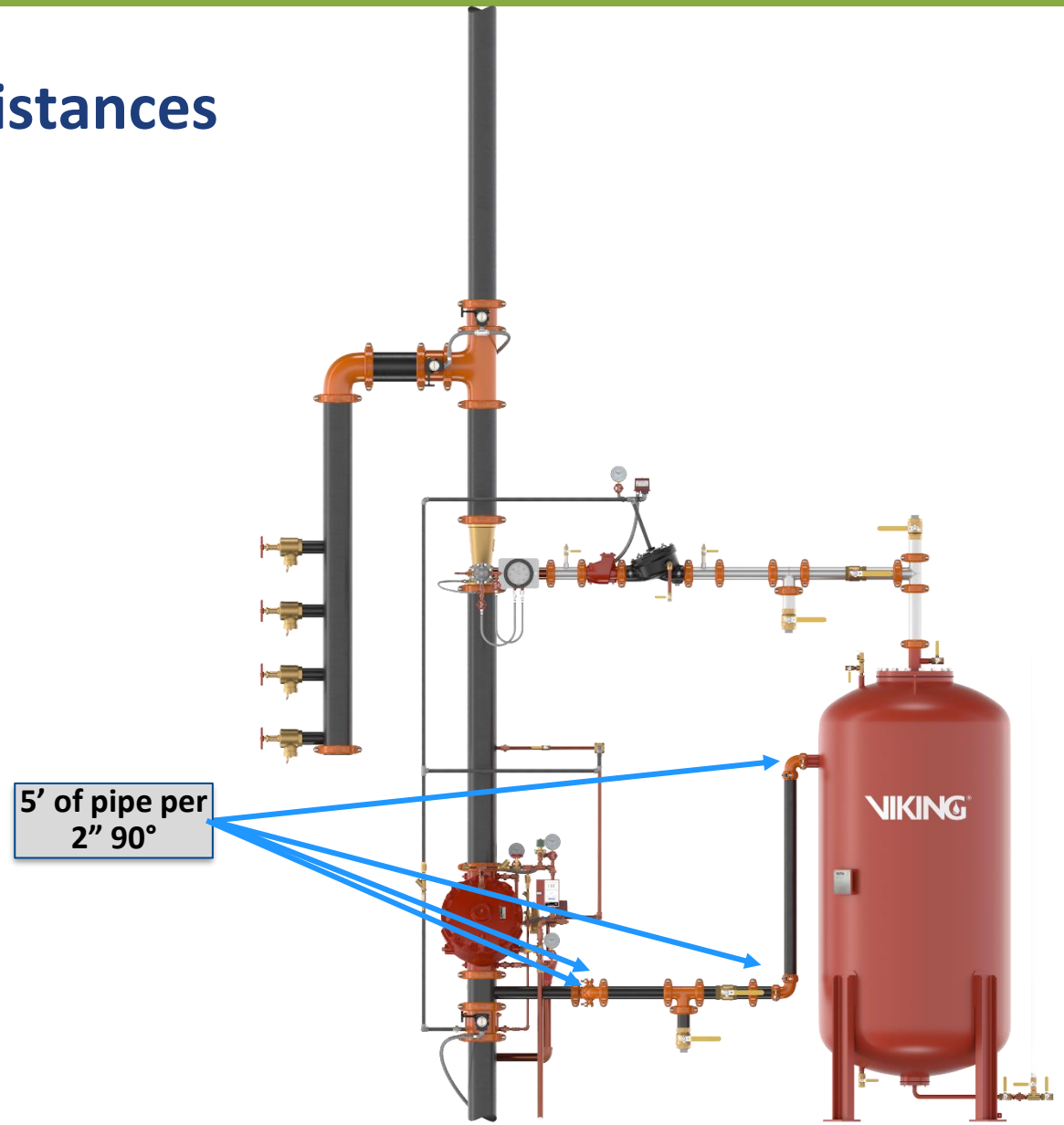
Pipe Equivalency Distances

(4) – 2” 90° = **20’**

6’ of steel pipe = **6’**

Total = 20’

Water supply piping not to exceed 100 equivalent feet of piping.



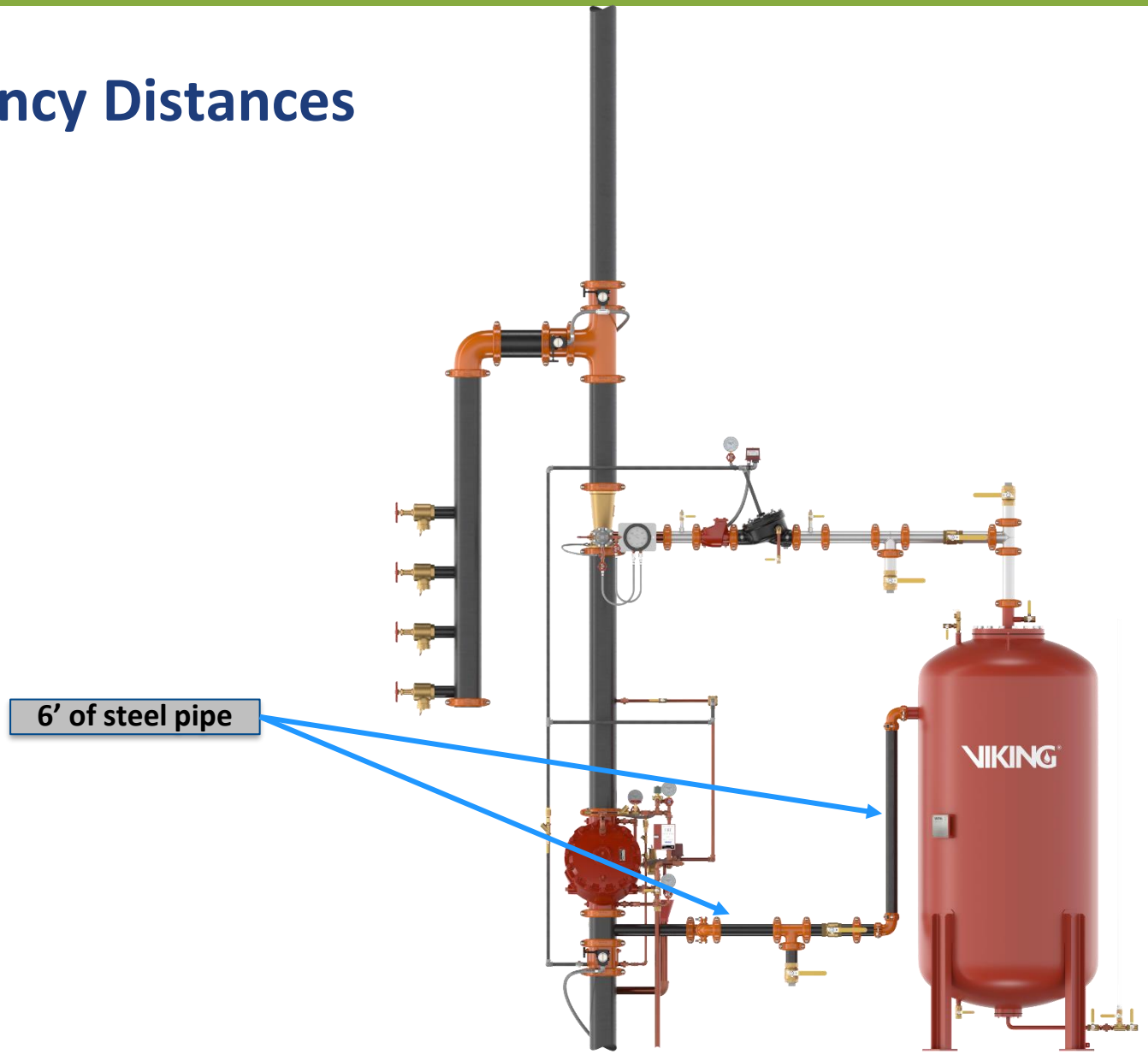
Pipe Equivalency Distances

(4) – 2” 90° = **20’**

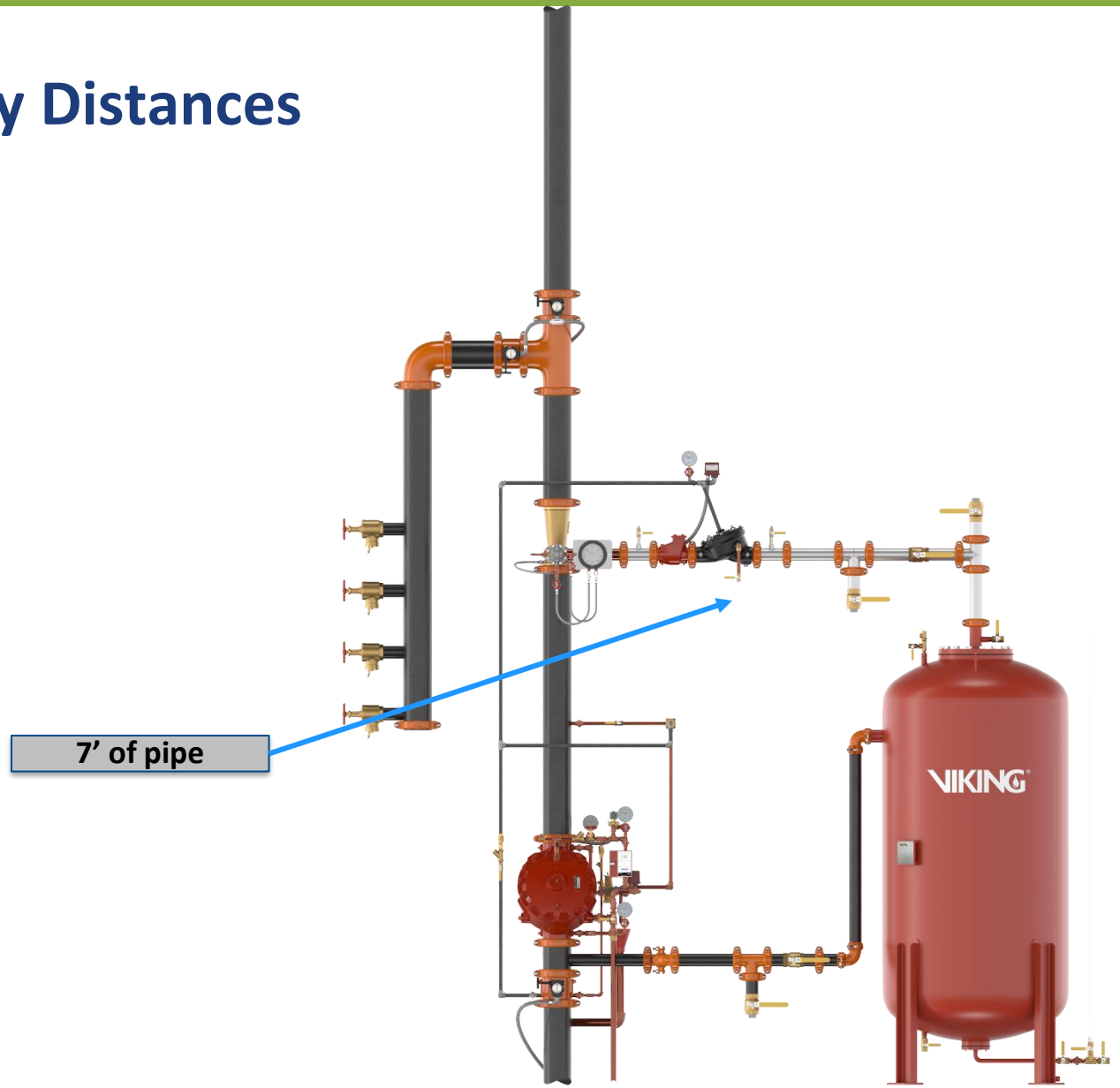
6’ of steel pipe = **6’**

Total = 26’

Water supply piping not to exceed 100 equivalent feet of piping.



Pipe Equivalency Distances



Stainless Steel pipe = **7’**

Stainless Steel Tee = **12’**

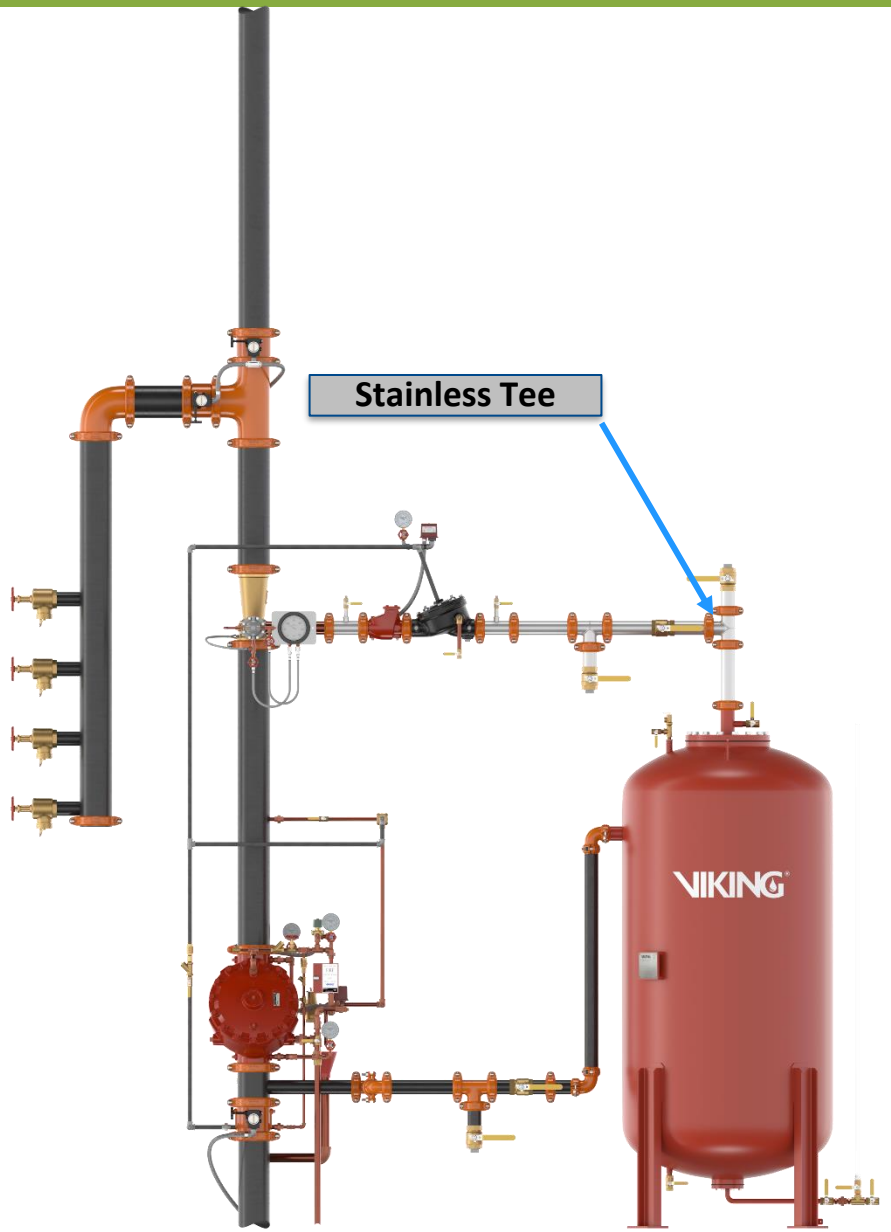
CCV = **12’**

Swing Check = **6’**

Total = 7’

Concentrate piping must not exceed 65 equivalent feet (19.8 meters).

Pipe Equivalency Distances



Stainless Steel pipe = **7’**

Stainless Steel Tee = **12’**

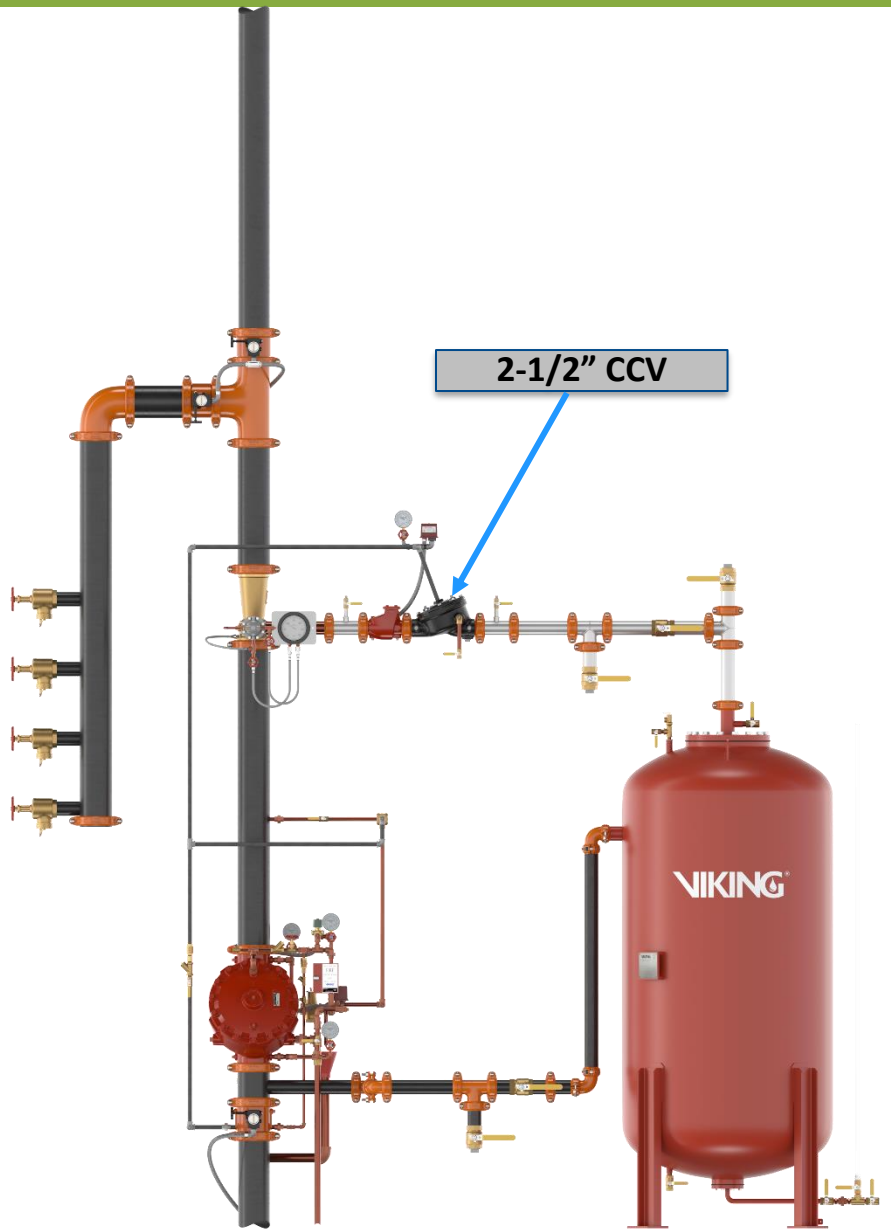
CCV = **12’**

Swing Check = **6’**

Total = 19’

Concentrate piping must not exceed 65 equivalent feet (19.8 meters).

Pipe Equivalency Distances



Stainless Steel pipe = **7'**

Stainless Steel Tee = **12'**

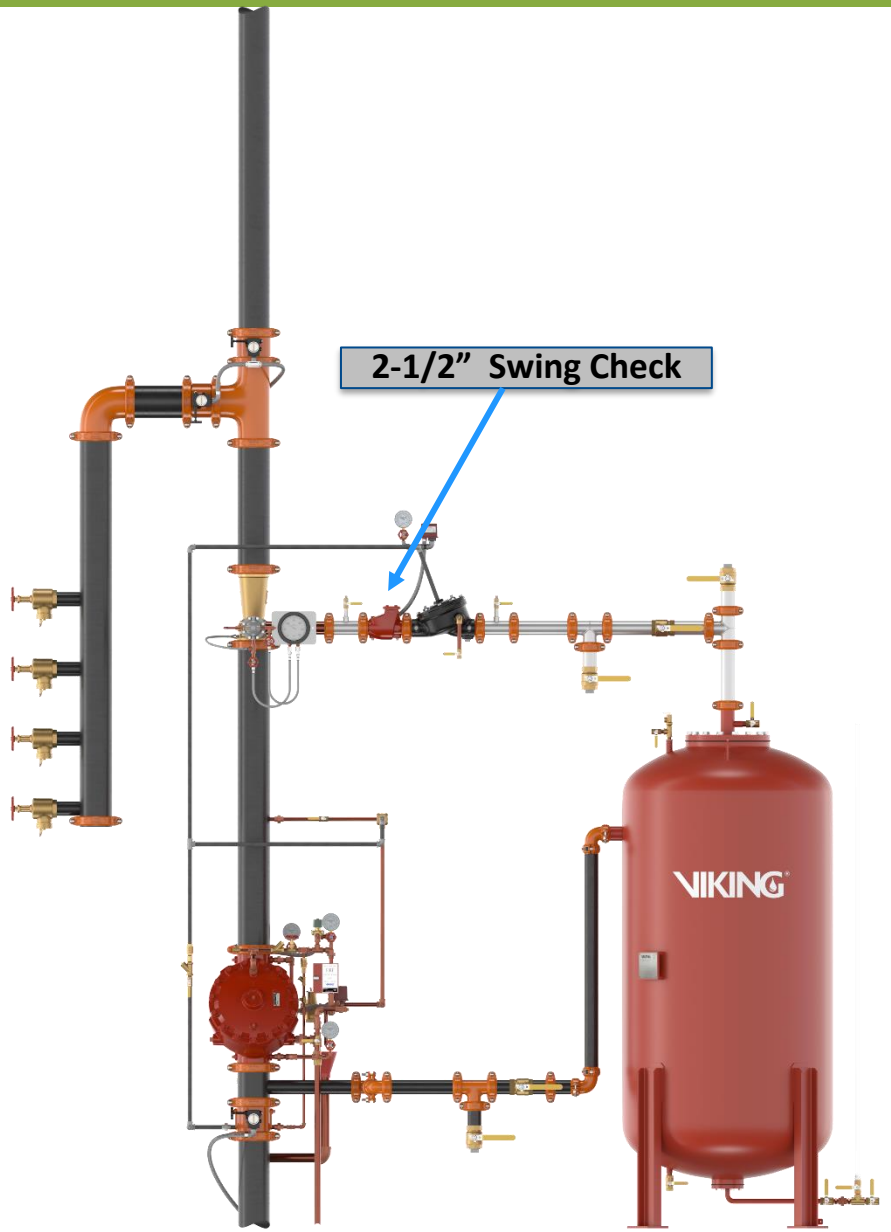
CCV = **12'**

Swing Check = **6'**

Total = 31'

Concentrate piping must not exceed 65 equivalent feet (19.8 meters).

Pipe Equivalency Distances



Stainless Steel pipe = **7’**

Stainless Steel Tee = **12’**

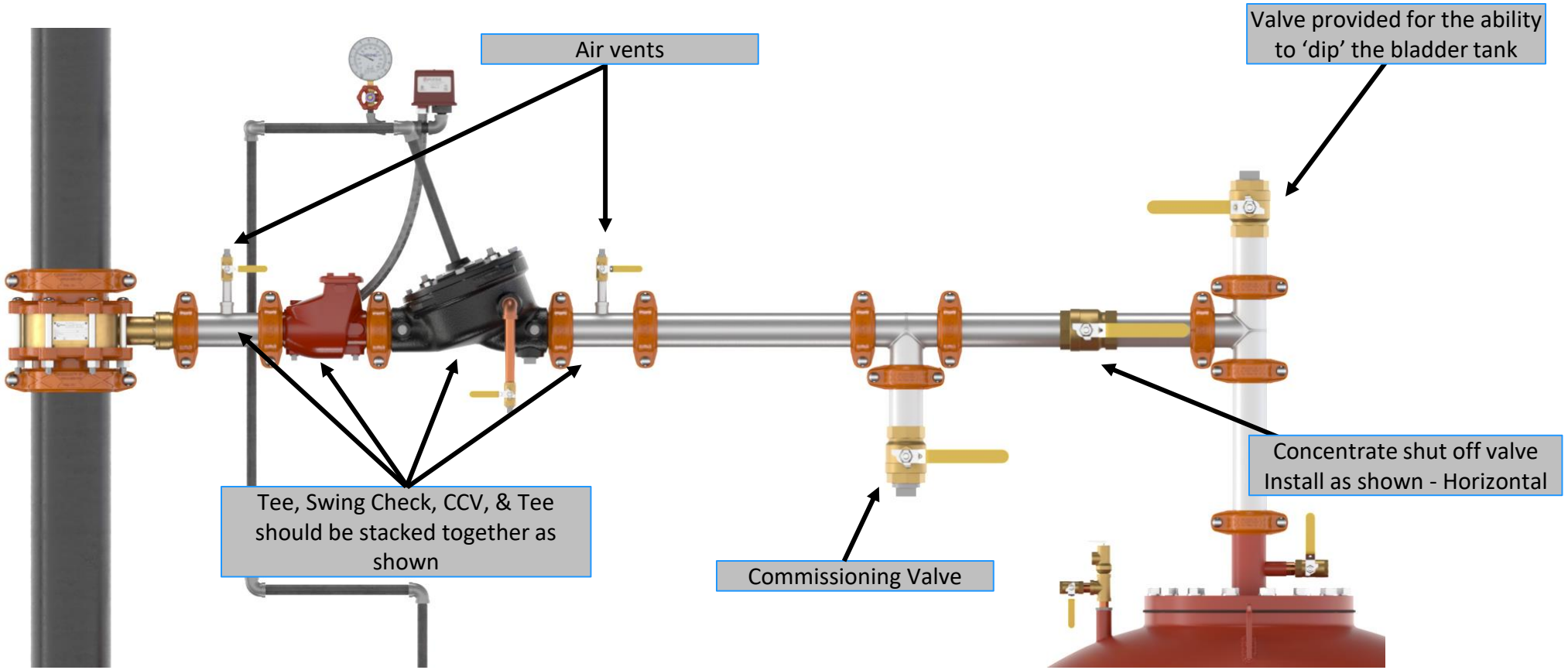
CCV = **12’**

Swing Check = **6’**

Total = 37’

Concentrate piping must not exceed 65 equivalent feet (19.8 meters).

Concentrate Piping Specifics



Concentrate supply piping & components shall be sized at 2 ½”

Model VFT Bladder Tanks

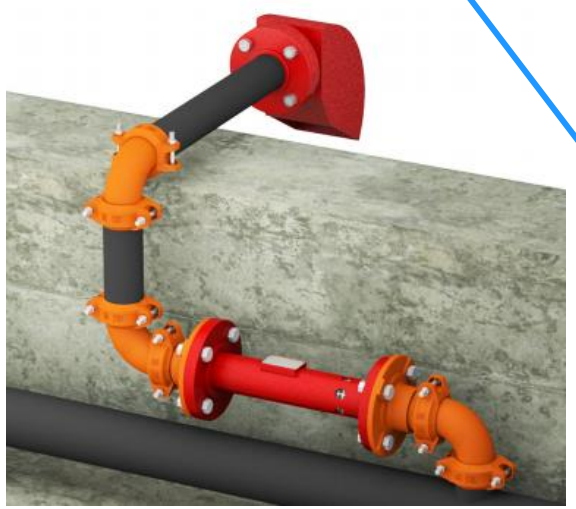
Product	Type of Equipment	Concentrate % in Water	Configuration	Approved Fuel Hazards	CCV Part No	CCV Value Size		CCV Min Actuator Pressure		CCV Max Operating Pressure		Type	Max Operating Pressure		Sizes	
						in	mm	psi	bar	psi	bar		psi	bar	gal	L
Vertical Bladder Tank Model VFT	Bladder Tank	3%	Vertical	Hydrocarbon, IPA, Acetone	Viking Corp Model E2, F2, H2, J2, Deluge Valve	1 ½. 2. 2 ½. 3. 4	40, 50, 65, 80, 100	20	(1.4)	250	17	ASME Section VIII Division 1, EN13445, Epoxy Coating (any color) or Stainless Steel	175 or 235	12 or 16	25 - 4000	95 - 15142
Horizontal Bladder Tank Model VFT	Bladder Tank	3%	Horizontal	Hydrocarbon, IPA, Acetone	Viking Corp Model E2, F2, H2, J2, Deluge Valve	1 ½, 2, 2 ½, 3, 4	40, 50, 65, 80, 100	20	(1.4)	250	17	ASME Section VIII Division 1, EN13445, Epoxy Coating (any color) or Stainless Steel	175 or 235	12 or 16	50 - 5250	189 - 19873

SFFF compatible

Approved Foam Makers

ARK Concentrate
- .2 for Hydrocarbon & Acetone
- .25 for IPA
- .16 for Ethanol

USP Concentrate
- .1 Hydrocarbons



Viking ARK Concentrate

Approved Fuel Hazards	Approved Flow Range		Approved Pressure Range		Connection	Construction Material	Sizes	
	gpm	Lpm	psi	bar			in	mm
Heptane, IPA, Acetone, Ethanol	**14-83**	53-314	**125**	9	Flanged	Painted carbon steel or stainless steel	**1.5**	40
Heptane, IPA, Acetone, Ethanol	**43-257**	163-973	**40-125**	3-9	Flanged	Painted carbon steel or stainless steel	**2.5**	65
IPA, Acetone, Ethanol	**95-500**	360-1893	**40-125**	3-9	Flanged	Painted carbon steel or stainless steel	**3**	80

Viking USP Concentrate

Approved Fuel Hazards	Approved Flow Range		Approved Pressure Range		Connection	Construction Material	Sizes	
	gpm	Lpm	psi	bar			in	mm
Heptane	**45-230**	170-871	**40-125**	3-9	Flanged	Painted carbon steel or stainless steel	**2.5**	65
Heptane	**101-392**	382-1503	**40-75**	3-5	Flanged	Painted carbon steel or stainless steel	**3**	80

Approved Foam Makers

ARK Concentrate

- .2 for Hydrocarbon & Acetone
- .25 for IPA
- .16 for Ethanol

USP Concentrate

- .1 Hydrocarbons

Viking ARK Concentrate

Approved Fuel Hazards	Approved Flow Range		Approved Pressure Range		Connection	Construction Material	Sizes	
	gpm	Lpm	psi	bar			in	mm
Heptane, IPA, Acetone, Ethanol	**151-755**	572-2858	**40-125**	3-9	Flanged	Painted carbon steel or stainless steel	**4**	100

Viking USP Concentrate

Approved Fuel Hazards	Approved Flow Range		Approved Pressure Range		Connection	Construction Material	Sizes	
	gpm	Lpm	psi	bar			in	mm
Jet A-1	**150 - 590**	568-2223	**40-75**	3-5	Flanged	Painted carbon steel or stainless steel	**4**	100

Listed Foam Chambers

Listed with the Viking USP Concentrate ONLY

- 2-1/2” – 3”
- 40 PSI – 125 PSI
- Application density of .1
- Requires an orifice plate
- Built specifically to the flow rate and pressure required

SFFF compatible

VIKING®

Monitors, Nozzles, and Oscillating Base

Listed with the Viking USP Concentrate ONLY

- Tiller Monitor (VMT)
- Non-Self Inducting nozzle (VNN)
- Application density of .16
- With or without Oscillating base

Grate & Helideck Nozzles

Approved with the Viking USP Concentrate ONLY

- GN200 & GN201 can be upgraded
- .1 Density

FM APPROVED

SFFF compatible

VIKING

Listed and Approved Foam Sprinklers

Up-to-date information available on Viking's innovative Sprinkler Selector!

- Find the right sprinkler by toggling on 'Foam sprinklers only'
- Use the 'Foam data' link to obtain the correct application density

GET DENSITY FROM THE MANUFACTURER!

NOT ALL FM AND NFPA DENSITIES ARE APPLICABLE TO SFFF!

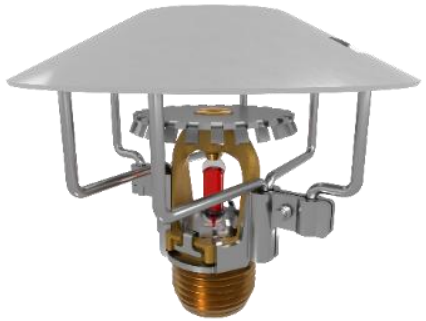
SFFF DENSITIES VARY BY MANUFACTURER.

Correctly Applying Densities

NFPA 30 Example

Table 16.5.2.3 Design Criteria for Foam-Water Sprinkler Protection of Single- or Double-Row Rack Storage of Ignitible (Flammable or Combustible) Liquids in Metal Containers, Portable Tanks, and IBCs

			Ceiling Sprinkler Protection				In-Rack Sprinkler Protection					
			Sprinkler		Design		Sprinkler					
Container Style and Capacity (gal)	Maximum Storage Height (ft)	Maximum Ceiling Height (ft)	Type	Response	Density (gpm/ft^2)	Area (ft^2)	Type	Response	Minimum Discharge Flow (gpm)	Layout *(See 16.5.1.10.)*	Notes	Fire Test Ref. *[See Table D.2(c).]*
NONRELIEVING-STYLE CONTAINERS — CLASS IB, CLASS IC, CLASS II, AND CLASS IIIA LIQUIDS# [FP < 200°F (93°C) AND BP ≥ 100°F (37.8°C)]												
≤5	25	30	K≥8.0	SR or QR(HT)	0.30	2000	K≥5.6	QR or SR(OT)	30	3	1, 2, 4, 5	1
>5 and ≤60	25	30	K≥8.0	SR(HT)	0.30	3000	K≥5.6	QR or SR(OT)	30	3	1, 3, 4, 5	2
NONRELIEVING-STYLE CONTAINERS — CLASS IIIB LIQUID# [FP ≥ 200°F (93°C)]												
≤60	40	50	K≥8.0	SR(HT)	0.30	2000	K≥5.6	QR or SR(OT)	30	4	1,5	3
RELIEVING-STYLE CONTAINERS — CLASS IB, CLASS IC, CLASS II, AND CLASS IIIA LIQUIDS# [FP < 200°F (93°C) AND BP ≥ 100°F (37.8°C)]												
≤5	25	30	K≥8.0	SR or QR(HT)	0.30	2000	K≥5.6	QR or SR(OT)	30	4	1, 2, 4, 5	4
>5 and ≤60, portable tanks and IBCs	25	30	K≥8.0	SR(HT)	0.30	3000	K≥5.6	—	30	4	1, 3, 4, 5	5
RELIEVING-STYLE CONTAINERS — CLASS IIIB LIQUID# [FP ≥ 200°F (93°C)]												
≤60	40	50	K≥8.0	SR(HT)	0.30	2000	K≥5.6	QR or SR(OT)	30	4	1, 5	6



Fluorine Free Low Expansion Foam Systems (SFFF)

Correctly Applying Densities

NFPA 30 Example

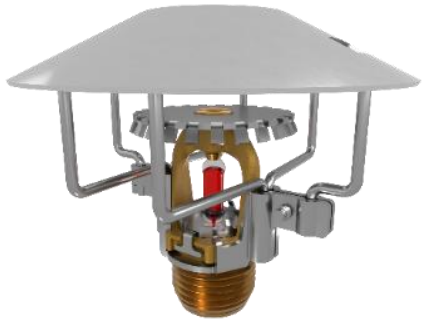
Table 16.5.2.3 Design Criteria for Foam-Water Sprinkler Protection of Single- or Double-Row Rack Storage of Ignitible (Flammable or Combustible) Liquids in Metal Containers, Portable Tanks, and IBCs

Container Style and Capacity (gal)	Maximum Storage Height (ft)	Maximum Ceiling Height (ft)	Ceiling Sprinkler Protection				In-Rack Sprinkler Protection					Fire Test Ref. *[See Table D.2(c).]*
			Sprinkler		Design		Sprinkler		Minimum Discharge Flow (gpm)	Layout *(See 16.5.1.10.)*	Notes	
			Type	Response	Density (gpm/ft^2)	Area (ft^2)	Type	Response				
NONRELIEVING-STYLE CONTAINERS — CLASS IB, CLASS IC, CLASS II, AND CLASS IIIA LIQUIDS# [FP < 200°F (93°C) AND BP ≥ 100°F (37.8°C)]												
≤5	25	30	K≥8.0	SR or QR(HT)	0.30	2000	K≥5.6	QR or SR(OT)	30	3	1, 2, 4, 5	1
>5 and ≤60	25	30	K≥8.0	SR(HT)	0.30	3000	K≥5.6	QR or SR(OT)	30	3	1, 3, 4, 5	2
NONRELIEVING-STYLE CONTAINERS —												
≤60	40	50	K≥8.0	SR(HT)	0.30	2						
RELIEVING-STYLE CONTAINERS — CLASS IB, CLASS IC, CLASS II, A												
≤5	25	30	K≥8.0	SR or QR(HT)	0.30	2						
>5 and ≤60, portable tanks and IBCs	25	30	K≥8.0	SR(HT)	0.30	3						
RELIEVING-STYLE CONTAINERS — CLASS IIIB LIQUID# [FP ≥ 200°F (93°C)]												
≤60	40	50	K≥8.0	SR(HT)	0.30	2000	K≥5.6	QR or SR(OT)	30	4	1, 5	6

Viking density maybe higher based on the FM approvals

Example:

- VK531 for hydrocarbons is .4
- No changes with in-racks



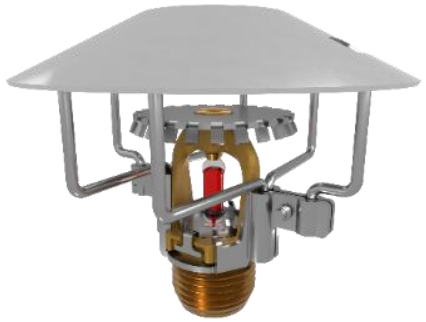
Fluorine Free Low Expansion Foam Systems (SFFF)

Correctly Applying Densities

FM 7-29 Example

Table 6. Rack Storage of Ignitable Liquids in Metal Containers larger than 6.5 gal (25 L) Up to and Including 60 gal (230 L) with Aisles a Minimum of 8 ft (2.4 m) Wide (Note 1)

Flash Point OR Liquid Type (Note 3)	Maximum Ceiling Height ft (m)	Maximum Storage Height ft (m)	Drum Orientation	Ceiling Sprinkler Protection				In-Rack Sprinkler Protection			
				Protection Type	Response/Nominal Temperature Rating/Orientation	K-factor gpm/psi$^{1/2}$ (L/min/bar$^{1/2}$)	Design, # Sprinklers @ Pressure psi (bar)	Layout (see figure indicated)	Response/Nominal Temperature Rating	K-factor gpm/psi$^{1/2}$ (L/min/bar$^{1/2}$)	Design, # Sprinklers @ Flow gpm (L/min) (see 2.4.1.6F)
Any (Note 2)	30 (9.1)	25 (7.6)	On-End	Foam-water	SR/High/Any	≥11.2 (161) (Note 4, 5)	30 @ 7 (0.5)	Fig. 3b Fig. 3c-1 Fig. 3c-2	QR/Ordinary	≥8.0 (115)	18 @ 45 (170) (6 per tier per rack)
<200°F (93°C)	30 (9.1)	25 (7.6)	On-End	Water	SR/High/Any	≥11.2 (161) (Note 4, 5)	50 @ 7 (0.5)	Fig. 3a Fig. 3c-1 Fig. 3c-2	QR/Ordinary	≥8.0 (115)	18 @ 45 (170) (6 per tier per rack)
					SR/High/Any	11.2 (161) (Note 4)	50 @ 29 (2.0)	Fig. 3b Fig. 3c-1 Fig. 3c-2	QR/Ordinary	≥8.0 (115)	18 @ 45 (170) (6 per tier per rack)
						14.0 (202)	50 @ 18 (1.2)				
						16.8 (235)	50 @ 13 (0.9)				
						25.2 (360)	50 @ 7 (0.5)				
			On-Side	Water	SR/High/Any	≥11.2 (161) (Note 4, 5)	50 @ 7 (0.5)	Fig. 3d	QR/Ordinary	≥8.0 (115)	18 @ 35 (133) (6 per tier per rack)
					SR/High/Any	11.2 (161) (Note 4)	50 @ 29 (2.0)	Fig. 3e	QR/Ordinary	≥8.0 (115)	18 @ 35 (133) (6 per tier per rack)
						14.0 (202)	50 @ 18 (1.2)				
						16.8 (235)	50 @ 13 (0.9)				
						25.2 (360)	50 @ 7 (0.5)				
Water-miscible liquids	30 (9.1)	25 (7.6)	On-End	Water	SR/High/Any	≥11.2 (161) (Note 4, 5)	50 @ 7 (0.5)	Fig. 3b Fig. 3c-1 Fig. 3c-2	QR/Ordinary	≥5.6 (81)	6 @ 25 (95) (one level of in racks) or 12 @ 15 (more than one level of in racks)
			On-Side	Water	SR/High/Any	≥11.2 (161) (Note 4, 5)	50 @ 7 (0.5)	Fig. 3d	QR/Ordinary	≥5.6 (81)	6 @ 25 (95) (one level of in racks) or 12 @ 15 (more than one level of in racks)
					Sr/High/Any	11.2 (161) (Note 4)	50 @ 29 (2.0)	Fig. 3e	QR/Ordinary	≥5.6 (81)	6 @ 25 (95) (one level of in racks) or 12 @ 15 (mroe than one level of in racks)
						14.0 (202)	50 @ 18 (1.2)				
						16.8 (235)	50 @ 13 (0.9)				
						25.2 (360)	50 @ 7 (0.5)				
≥200°F (93°C)	30 (9.1)	25 (7.6)	On-end	Water	SR/High/Any	≥11.2 (161) (Note 4, 5)	50 @ 7 (0.5)	Fig. 3f Fig. 3c-1 Fig. 3c-2	QR/Ordinary	≥5.6 (81)	6 @ 25 (95) (one level of in racks)
			On-Side	Water	SR/High/Any	≥11.2 (161) (Note 4, 5)	50 @ 7 (0.5)	Fig. 3g	QR/Ordinary	≥5.6 (81)	6 @ 25 (95) (one level of in racks)



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Fluorine Free Low Expansion Foam Systems (SFFF)

Correctly Applying Densities

FM 7-29 Example

Table 6. Rack Storage of Ignitable Liquids in Metal Containers larger than 6.5 gal (25 L) Up to and Including 60 gal (230 L) with Aisles a Minimum of 8 ft (2.4 m) Wide (Note 1)

Flash Point OR Liquid Type (Note 3)	Maximum Ceiling Height ft (m)	Maximum Storage Height ft (m)	Drum Orientation	Ceiling Sprinkler Protection				In-Rack Sprinkler Protection			
				Protection Type	Response/Nominal Temperature Rating/Orientation	K-factor gpm/psi$^{1/2}$ (L/min/bar$^{1/2}$)	Design, # Sprinklers @ Pressure psi (bar)	Layout (see figure indicated)	Response/Nominal Temperature Rating	K-factor gpm/psi$^{1/2}$ (L/min/bar$^{1/2}$)	Design, # Sprinklers @ Flow gpm (L/min) (see 2.4.1.6F)
Any (Note 2)	30 (9.1)	25 (7.6)	On-End	Foam-water	SR/High/Any	≥11.2 (161) (Note 4, 5)	30 @ 7 (0.5)	Fig. 3b Fig. 3c-1 Fig. 3c-2	QR/Ordinary	≥8.0 (115)	18 @ 45 (170) (6 per tier per rack)
<200°F (93°C)	30 (9.1)	25 (7.6)	On-End	Water	SR/High/Any	≥11.2 (161) (Note 4, 5)	50 @ 7 (0.5)	Fig. 3a Fig. 3c-1 Fig. 3c-2	QR/Ordinary	≥8.0 (115)	18 @ 45 (170) (6 per tier per rack)
					SR/High/Any	11.2 (161) (Note 4)	50 @ 29 (2.0)	Fig. 3b Fig. 3c-1	QR/Ordinary	≥8.0 (115)	18 @ 45 (170) (6 per tier per rack)
			On-Side						QR/Ordinary	≥8.0 (115)	18 @ 35 (133) (6 per tier per rack)
									QR/Ordinary	≥8.0 (115)	18 @ 35 (133) (6 per tier per rack)
Water-miscible liquids	30 (9.1)	25 (7.6)	On-End					3c-1	QR/Ordinary	≥5.6 (81)	6 @ 25 (95) (one level of in racks) or 12 @ 15 (more than one level of in racks)
			On-Side						QR/Ordinary	≥5.6 (81)	6 @ 25 (95) (one level of in racks) or 12 @ 15 (more than one level of in racks)
									QR/Ordinary	≥5.6 (81)	6 @ 25 (95) (one level of in racks) or 12 @ 15 (mroe than one level of in racks)
≥200°F (93°C)	30 (9.1)	25 (7.6)	On-end					3c-1	QR/Ordinary	≥5.6 (81)	6 @ 25 (95) (one level of in racks)
			On-Side						QR/Ordinary	≥5.6 (81)	6 @ 25 (95) (one level of in racks)

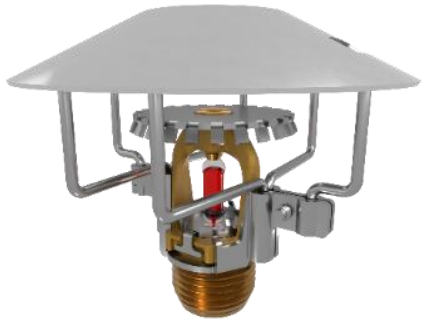
Based on 100 Sq. ft.

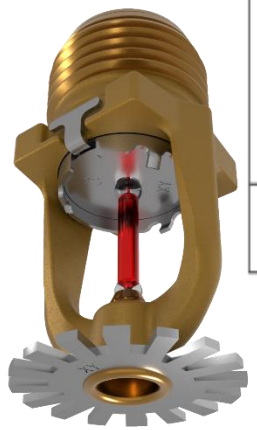
30 Sprks = 3,000 Sq. ft.

7 PSI from an 11.2 K-Factor is 30 GPM or a .3 per Sq. ft.

Viking Densities maybe higher for specific fuels

If Viking's density is a .4 then 30 Sprks at 13 PSI (pressure required to push 40 GPM) would be required.





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Bladder Tank Sizing Example

Density x Area x Concentrate % x Duration x Safety Factor % = Concentrate Amount

Existing system example using NFPA16 (Now combined into NFPA 11)

.16 gpm/sq. ft. x 5,000 sq. ft. x 3% x 10 mins. x 15% = **276 Gallons**

Needs a **300**-gallon capacity bladder tank.
˜8’ High & ˜ 3’ Diameter

**Minimum durations based upon the applicable standard*

Bladder Tank Sizing

Density x Area x Concentrate % x Duration x Safety Factor % = Concentrate Amount

NEW system configuration

.3 gpm/sq. ft. x 5,000 sq. ft. x 3% x 10 mins x 15% = **518 Gallons**

Needs a **600**-gallon capacity bladder tank. (˜9’ High & ˜4’ wide)

Product	Type of Equipment	Concentrate % in Water	Configuration	Approved Fuel Hazards	Min Solution Application Rate		Max Subsequent Water Application Rate		Min Installation Height		Max Installation Height		Connection	Orientation	K-factor
					gpm/ ft²	(lpm/ min)	gpm/ ft²	(lpm/ min)	ft	(m)	ft	(m)			
VK1001, VK3001	Automatic Foam Water Sprinkler	3%	For use with proportioners specifically tested with this concentrate, pre-mixed solution or Water Motor-Powered Positive Displacement Pumps within acceptable viscosity / range only.	Hydrocarbon, IPA, Acetone	0.3	(12.2)	0.3	(12.2)	6	(1.8)	24.8	(7.6)	½”	Upright	5.6

In-line Balanced Pressure Proportioner (ILBP)

ARK Concentrate

Type of Equipment	Concentrate % in Water	Configuration	Approved Fuel Hazards	Approved Flow Range		Approved Pressure Range		Connection	Construction Material	Sizes	
				gpm	lpm	psi	bar			in	mm
Ratio Controller with balancing valve ILBP	3%	For use with Viking bladder tanks and discharge devices as appear in the FM Approval Guide only.	Hydrocarbon, IPA, Acetone, Ethanol	**523-1273**	1980-4819	**30-175**	2-12	Grooved or Flanged	NAB or brass	4	100
Ratio Controller with balancing valve ILBP	3%	For use with Viking bladder tanks and discharge devices as appear in the FM Approval Guide only	Hydrocarbon, IPA, Acetone, Ethanol	**1050-2315**	3975-8763	**30-175**	2-12	Grooved or Flanged	NAB or brass	6	150

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In-line Balanced Pressure Proportioner (ILBP)

USP Concentrate

Type of Equipment	Concentrate % in Water	Configuration	Approved Fuel Hazards	Approved Flow Range		Approved Pressure Range		Connection	Construction Material	Sizes	
				gpm	lpm	psi	bar			in	mm
Ratio Controller with balancing valve ILBP	3%	For use with Viking bladder tanks and discharge devices as appear in the FM Approval Guide only.	Hydrocarbon, Jet A-1	**180-760**	681-2877	30-175	2-12	Grooved or Flanged	NAB or brass	3	80
Ratio Controller with balancing valve ILBP	3%	For use with Viking bladder tanks and discharge devices as appear in the FM Approval Guide only.	Hydrocarbon, Jet A-1	**455-1275**	1722-4826	30-175	2-12	Grooved or Flanged	NAB or brass	4	100
Ratio Controller with balancing valve ILBP	3%	For use with Viking bladder tanks and discharge devices as appear in the FM Approval Guide only.	Hydrocarbon, Jet A-1	**1240-2640**	4693-9993	30-175	2-12	Grooved or Flanged	NAB or brass	6	150
Ratio Controller with balancing valve ILBP	3%	For use with Viking bladder tanks and discharge devices as appear in the FM Approval Guide only.	Hydrocarbon, Jet A-1	**1650-4250**	6246-16088	30-175		Grooved or Flanged	NAB or brass	8	200

In-line Balanced Pressure Proportioner (ILBP)

USP Concentrate

Type of Equipment	Concentrate % in Water	Configuration	Approved Fuel Hazards	Approved Flow Range		Approved Pressure Range		Connection	Construction Material	Sizes	
				gpm	Lpm	psi	bar			in	mm
Ratio Controller with balancing valve ILBP	3%	For use with Viking bladder tanks and discharge devices as appear in the FM Approval Guide only.	Hydrocarbon, Jet A-1	**1870-760**	681-2877	30-175	2-12	Grooved or Flanged	NAB or brass	3	80
Ratio Controller with balancing valve ILBP	3%	For use with Viking bladder tanks and discharge devices as appear in the FM Approval Guide only.	Hydrocarbon, Jet A-1	**455-1275**	1722-4826	30-175	2-12	Grooved or Flanged	NAB or brass	4	100
Ratio Controller with balancing valve ILBP	3%	For use with Viking bladder tanks and discharge devices as appear in the FM Approval Guide only.	Hydrocarbon, Jet A-1	**1240-2640**	4693-9993	30-175	2-12	Grooved or Flanged	NAB or brass	6	150
Ratio Controller with balancing valve ILBP	3%	For use with Viking bladder tanks and discharge devices as appear in the FM Approval Guide only.	Hydrocarbon, Jet A-1	**1650-4250**	6246-16088	30-175		Grooved or Flanged	NAB or brass	8	200

UL flow ranges are different than FM

- 6” ILBP 1512-2740 GPM
- 8” ILBP 2330-4130 GPM

Wide Range Proportioner

ARK Concentrate

Product	Type of Equipment	Concentrate % in Water	Configuration	Approved Fuel Hazards	Approved Flow Range		Approved Pressure Range		Connection	Construction Material	Sizes	
					gpm	Lpm	psi	bar			in	mm
Model VNR Wide Range Proportioner	Wide Range Proportioner	3%	For use with Viking Corp. bladder tanks and discharge devices as appear in the FM Approval Guide only.	Hydrocarbon, IPA, Acetone	50-1895	(189-7173)	30-175	(2-12)	Grooved	Brass	6	(150)
Model VNR Wide Range Proportioner	Wide Range Proportioner	3%	For use with Viking Corp. bladder tanks and discharge devices as appear in the FM Approval Guide only.	Hydrocarbon, IPA, Acetone	50-3003	(189-11366)	30-175	(2-12)	Grooved	Brass	8	(200)

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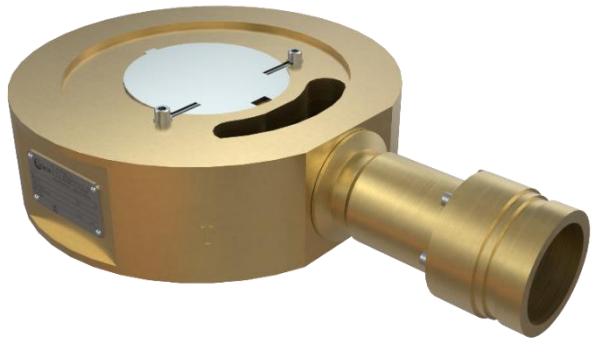

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Wide Range Proportioner

USP Concentrate

Product	Type of Equipment	Concentrate % in Water	Configuration	Approved Fuel Hazards	Approved Flow Range		Approved Pressure Range		Connection	Construction Material	Sizes	
					gpm	Lpm	psi	bar			in	mm
Model VNR Wide Range Proportioner	Wide Range Proportioner	3%	For use with Viking Corp. bladder tanks and discharge devices as appear in the FM Approval Guide only.	Hydrocarbon, Jet A-1	**50-1420**	(189-7173)	30-175	2-12	Water	Brass	6	150
Model VNR Wide Range Proportioner	Wide Range Proportioner	3%	For use with Viking Corp. bladder tanks and discharge devices as appear in the FM Approval Guide only.	Hydrocarbon, Jet A-1	**50-3010**	(189-11366)	30-175	2-12	Water	Brass	8	200

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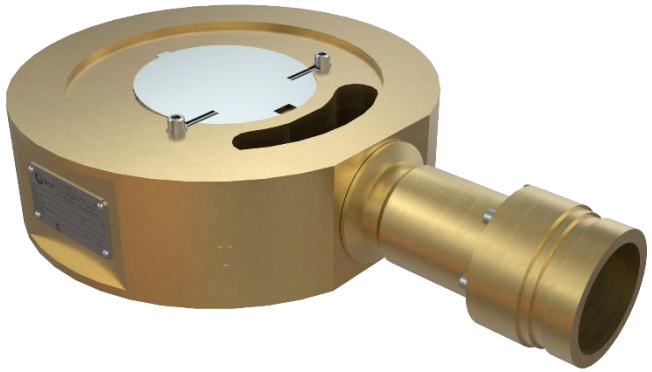

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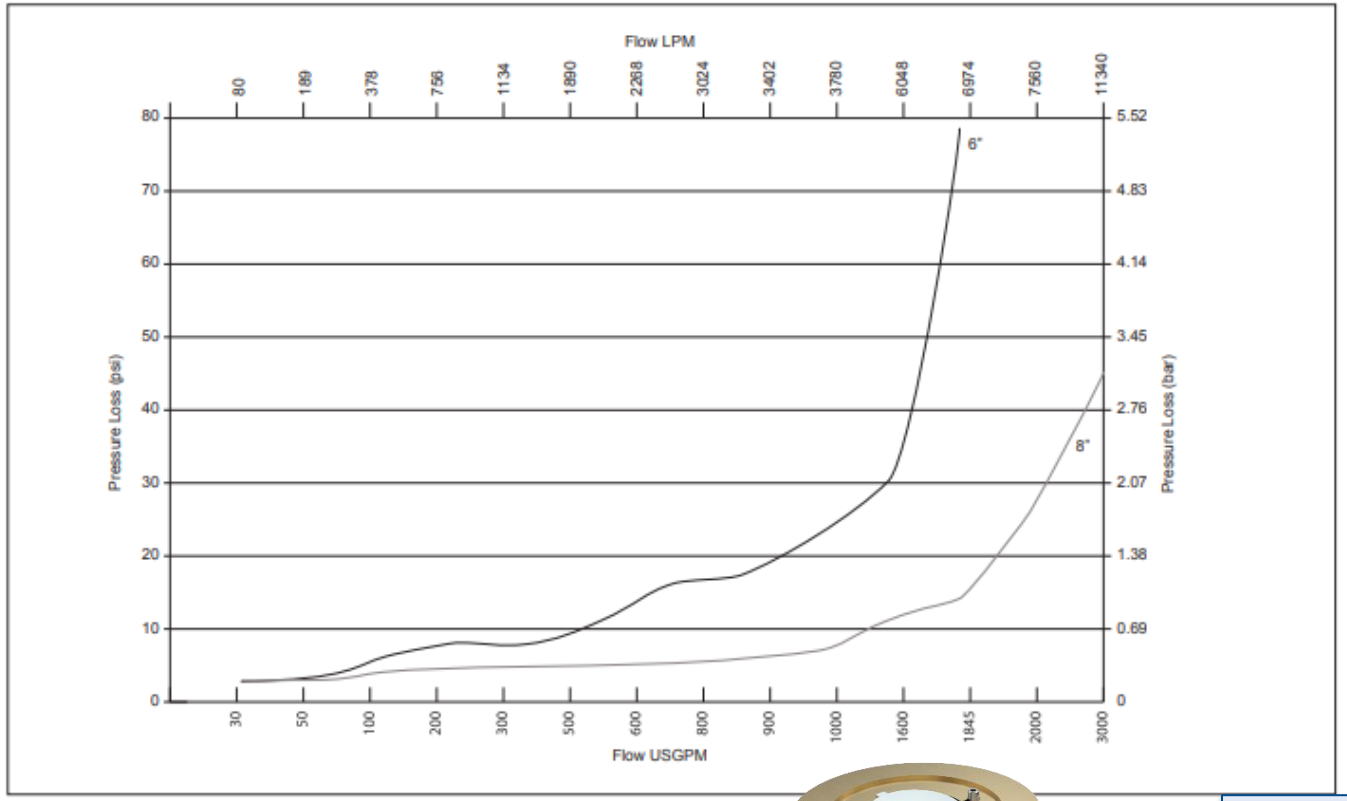
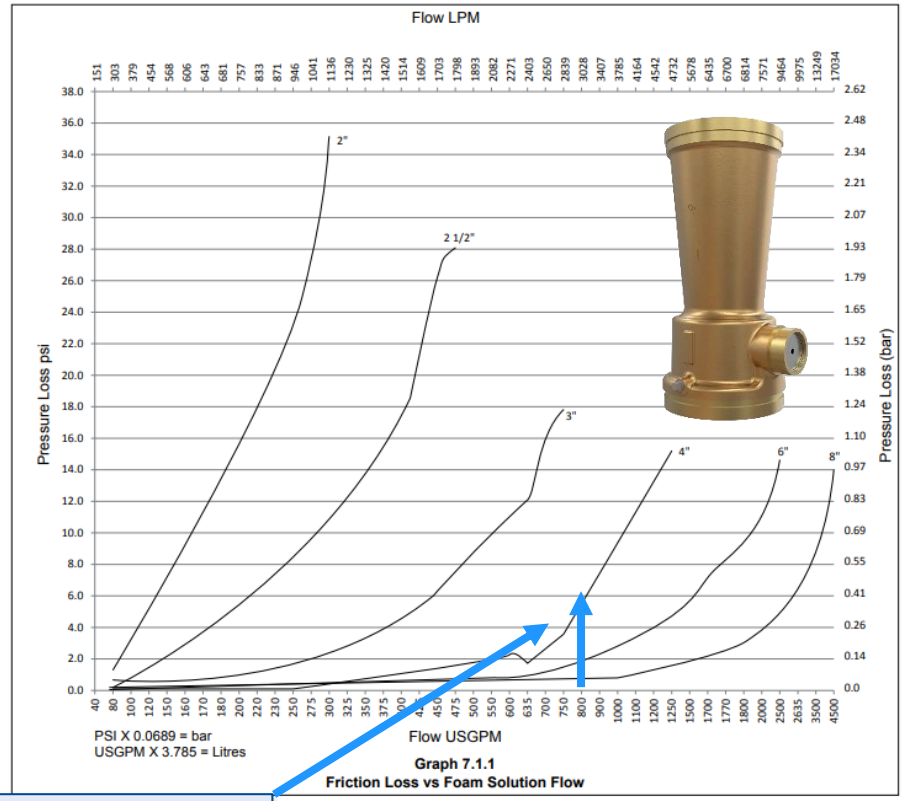
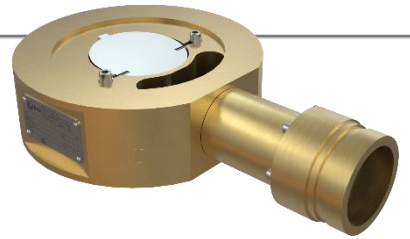
Proportioner Friction Loss Considerations

Friction loss comparisons





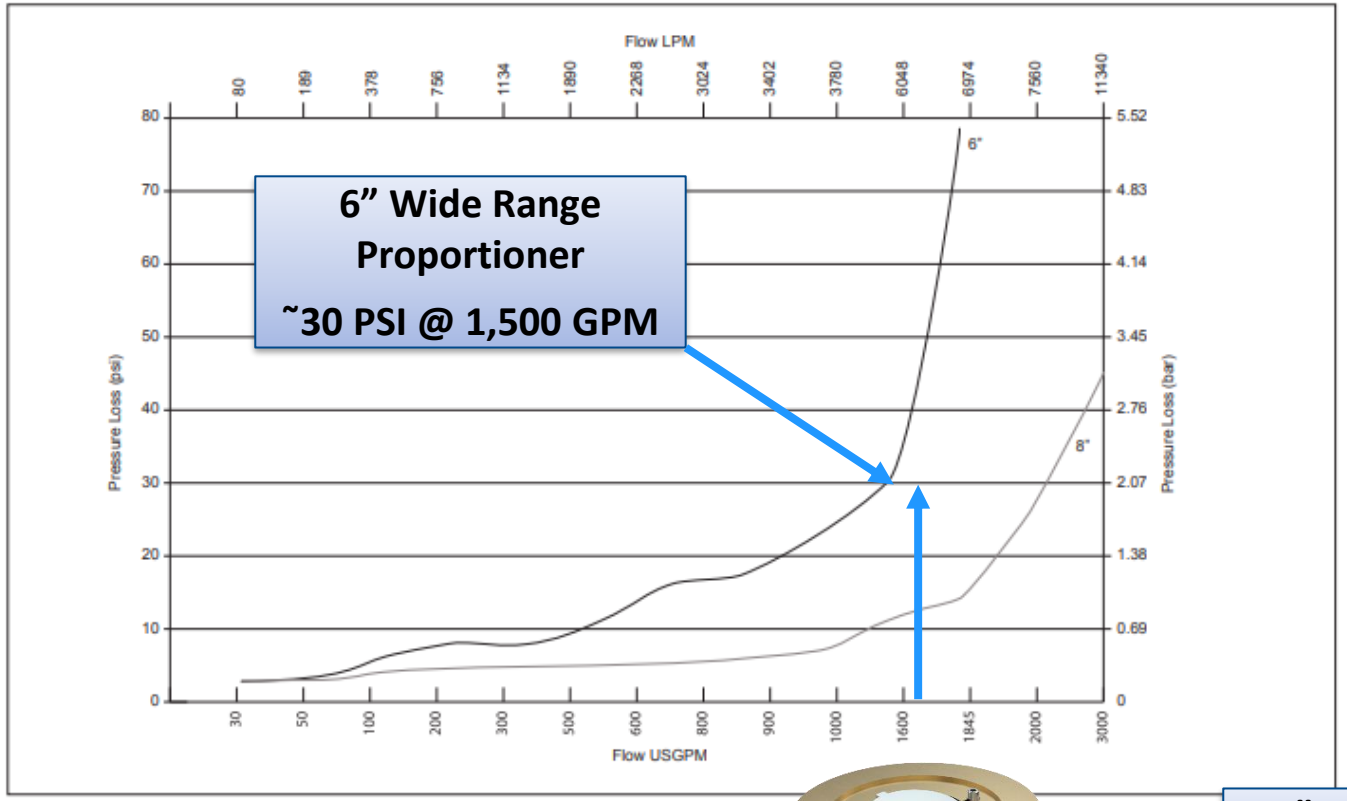


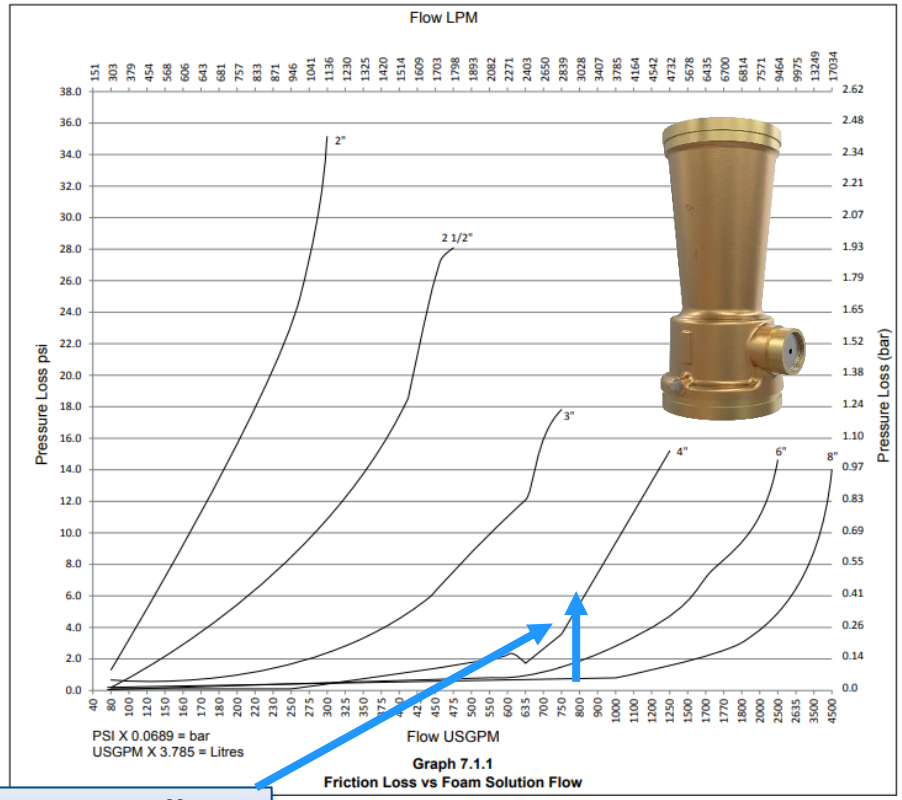
4” Ratio Controller

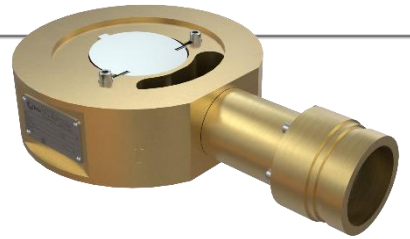
~6 PSI @ 800 GPM

Proportioner Friction Loss Considerations

Friction loss comparisons





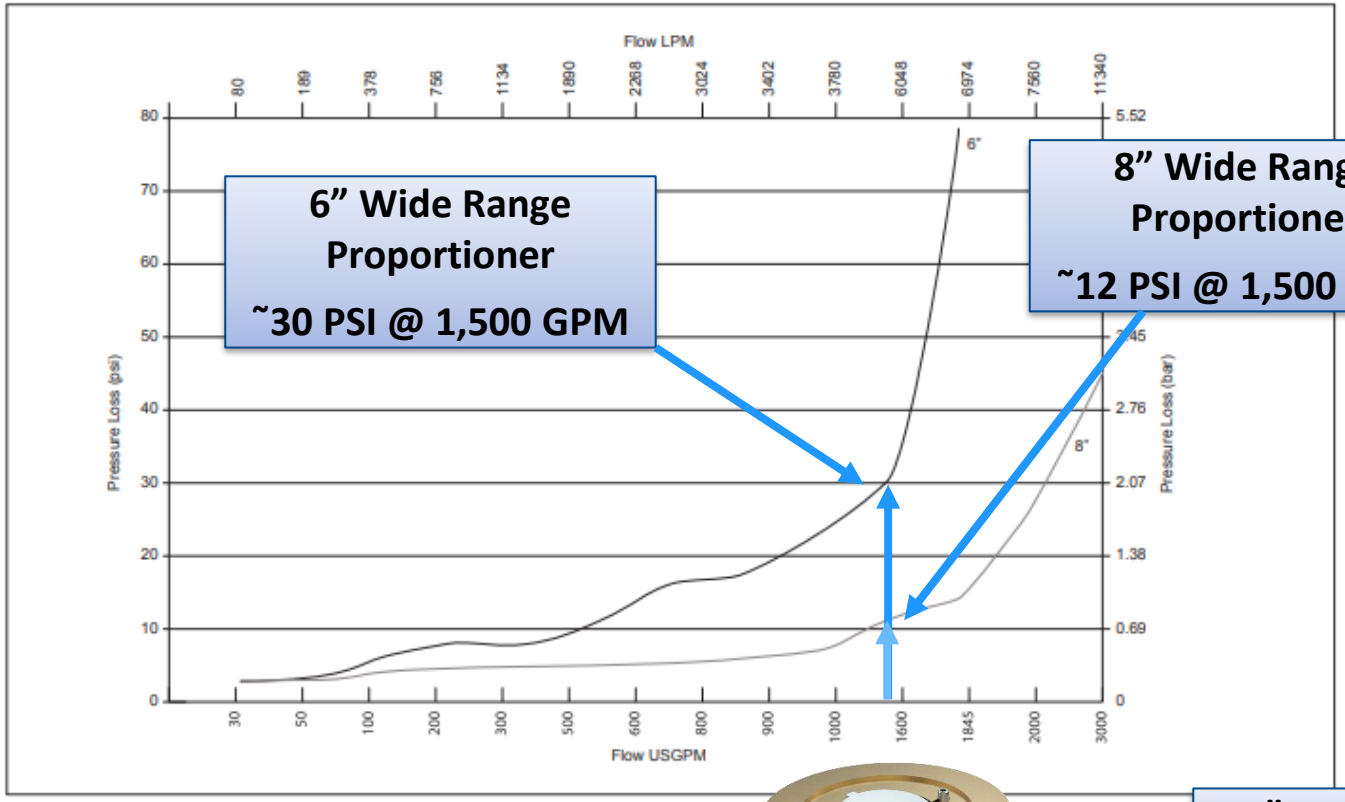


4” Ratio Controller

˜6 PSI @ 800 GPM

Proportioner Friction Loss Considerations

Friction loss considerations

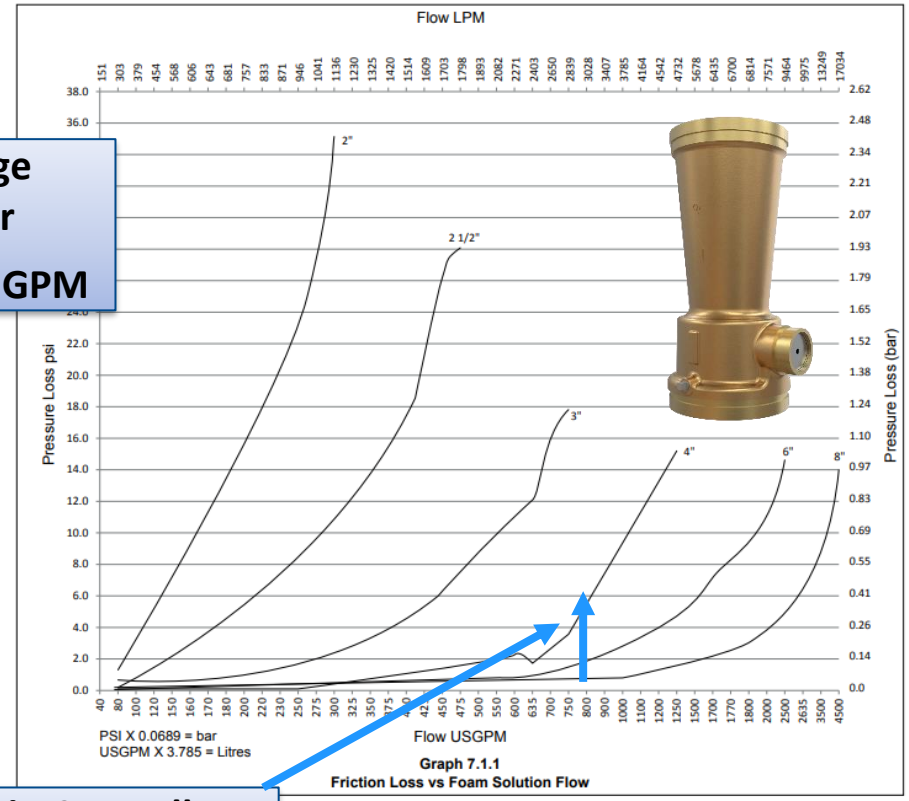


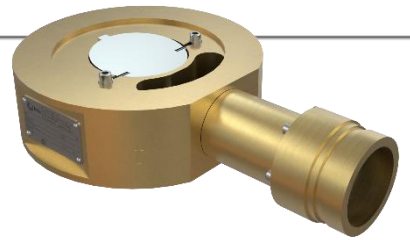
6” Wide Range Proportioner

~30 PSI @ 1,500 GPM

8” Wide Range Proportioner

~12 PSI @ 1,500 GPM





4” Ratio Controller

~6 PSI @ 800 GPM

Information Review

Must know the fuel to determine which concentrate is appropriate for the system

- USP concentrate is **UL listed** and **FM approved** for use on **hydrocarbon only fires**
- ARK concentrate is **FM approved** for use on **hydrocarbon, ethanol, acetone, and IPA fires**

Information Review

Must retrieve discharge densities from the manufacturer

- **FM approved** sprinkler densities determined by the orientation, installation height, k-factor, and fuel(s)
  - **UL listed** sprinkler have less requirements
- Other discharge device densities will vary

Information Review

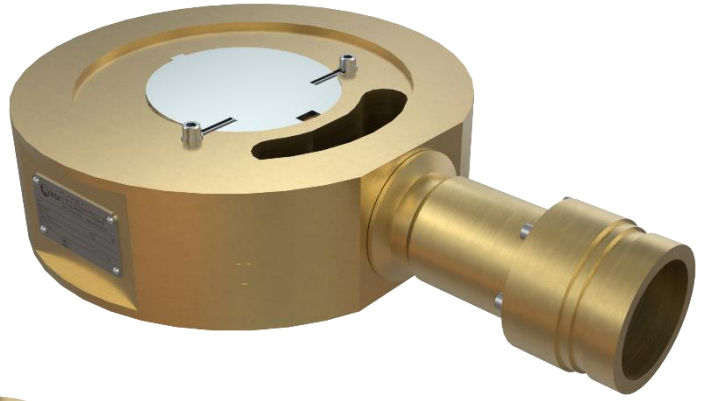
The only **FM approved** and **UL listed** model is the VFT

- Bladder change is possible under specific considerations
- Typically the entire bladder tank will need to be replaced

Information Review

Proportioner options determined by system type and considerations

- Wide Range proportioner is **FM approved**
- ILBP is **UL listed** and **FM approved**
- **UL listed** and **FM approved** ratio controllers available for deluge systems



Digital LoEx Estimator Tool

- Our LoEx Estimator is the EASIEST way to calculate your complete SFFF foam package needs!
- Generates a complete system bill of materials any time of day
- Free and user-friendly

Summary of Product Listings and Approvals

Product	UL Listed USP Only	FM Approved	
		USP	ARK
VFT Bladder Tank	YES ✓	YES ✓	YES ✓
Wide Range Proportioner	NO ✗	YES ✓	YES ✓
ILBP Proportioner	YES ✓	YES ✓	YES ✓
Ratio Controller	YES ✓	YES ✓	YES ✓
Foam Water Sprinklers	YES ✓	YES ✓	YES ✓
Foam Makers	NO ✗	YES ✓	YES ✓
Foam Chambers	YES ✓	NO ✗	NO ✗
Monitors and Nozzles	YES ✓	NO ✗	NO ✗
Grate Nozzle	NO ✗	YES ✓	NO ✗
Helideck Nozzle	NO ✗	YES ✓	NO ✗

Fluorine Free Low Expansion Foam Systems (SFFF)

Minimax MXone

SFFF compatible

Maximum Flow of 1,050 GPM
Maximum Throw Distance of 262’
32 GPM of Foam Concentrate at Maximum Flow

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