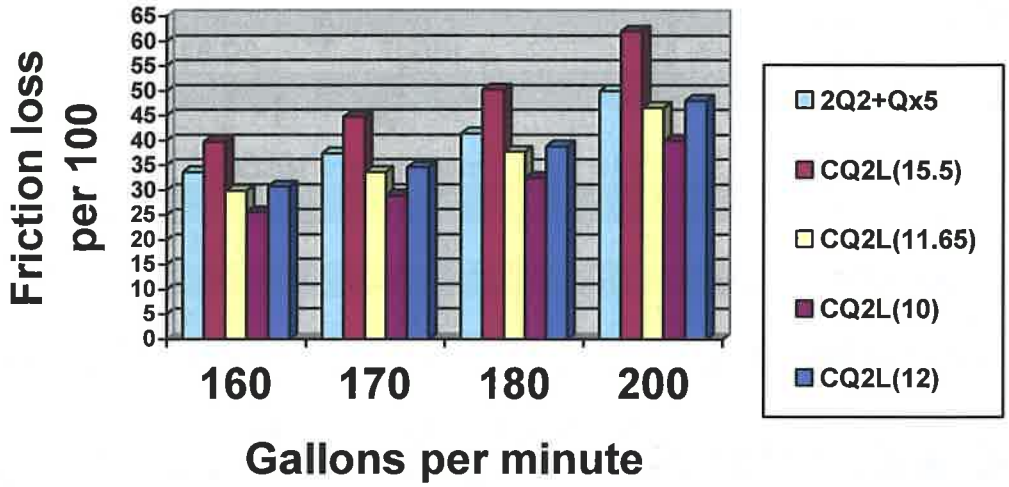
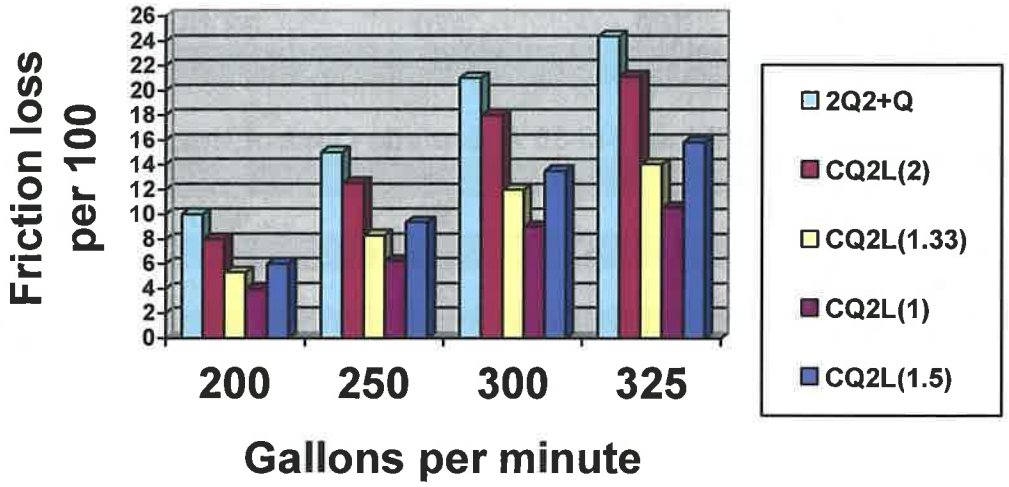
Comparison of friction loss in 1 ¾ and 2 ½ inch hose lines

1 3/4" hose friction loss



2 1/2" hose friction loss



1 ¾ Inch friction loss comparison tables

7/8 Inch Smoothbore Nozzle

Formula/co.	N.P.	Flow/GPM	Psi. FL/100.	Difference
$2Q^2+Q$ (x5)	**50**	**160**	**33.6**	**Baseline=100%**
CQ^2L (15.5)	50	160	39.68	**118.06%**
CQ^2L (11.65)	50	160	29.82	**88.75%**
CQ^2L (12)	50	160	30.72	**91.42%**

15/16 inch Smoothbore Nozzle

Formula/co.	N.P.	Flow/GPM	Psi. FL/100.	Difference
$2Q^2+Q$ (x5)	**50**	**180**	**41.4**	**Baseline=100%**
CQ^2L (15.5)	50	180	50.22	**121.30%**
CQ^2L (11.65)	50	180	37.74	**91.15%**
CQ^2L (12)	50	180	38.88	**93.91%**

1 inch Smoothbore Nozzle

Formula/co.	N.P.	Flow/GPM	Psi. FL/100.	Difference
$2Q^2+Q$ (x5)	**50**	**200**	**50**	**Baseline=100%**
CQ^2L (15.5)	50	200	62	**124%**
CQ^2L (11.65)	50	200	46.6	**93.2%**
CQ^2L (12)	50	200	48	**96%**

Task Force Tip Automatic Control Nozzle

Formula/co.	N.P.	Flow/GPM	Psi. FL/100.	Difference
$2Q^2+Q$ (x5)	**100**	**170**	**37.4**	**Baseline=100%**
CQ^2L (15.5)	100	170	44.79	**119.75%**
CQ^2L (11.65)	100	170	33.66	**97.84%**
CQ^2L (12)	100	170	34.6	**92.51%**

Elkhart SM-30 Automatic Control Nozzle

Formula/co.	N.P.	Flow/GPM	Psi. FL/100.	Difference
$2Q^2+Q$ (x5)	**85**	**190**	**45.6**	**Baseline=100%**
CQ^2L (15.5)	85	190	55.95	**122.69%**
CQ^2L (11.65)	85	190	42.05	**92.21%**
CQ^2L (12)	85	190	43.32	**95%**

2 ½ Inch friction loss comparison tables

1 Inch Smoothbore Nozzle

Formula/co.	N.P.	Flow/GPM	Psi. FL/100.	Difference
$2Q^2+Q$	**50**	**200**	**10**	**Baseline=100%**
CQ^2L (2)	50	200	8	**80%**
CQ^2L (1.33)	50	200	5.32	**53.2%**
CQ^2L (1)	50	200	4	**40%**
CQ^2L (1.5)	50	200	6	**60%**

1 ⅛ Inch Smoothbore Nozzle

Formula/co.	N.P.	Flow/GPM	Psi. FL/100.	Difference
$2Q^2+Q$	**50**	**250**	**15**	**Baseline=100%**
CQ^2L (2)	50	250	12.5	**83.33%**
CQ^2L (1.33)	50	250	8.31	**55.4%**
CQ^2L (1.5)	50	250	9.37	**62.46%**

1 1/4 Inch Smoothbore Nozzle

Formula/co.	N.P.	Flow/GPM	Psi. FL/100.	Difference
$2Q^2+Q$	**50**	**325**	**24.37**	**Baseline=100%**
CQ^2L (2)	50	325	21.12	**86.66%**
CQ^2L (1.33)	50	325	14.04	**57.61%**
CQ^2L (1.5)	50	325	15.84	**64.99%**

Task Force Tip Automatic Control Nozzle

Formula/co.	N.P.	Flow/GPM	Psi. FL/100.	Difference
$2Q^2+Q$	**100**	**250**	**15**	**Baseline=100%**
CQ^2L (2)	100	250	12.5	**83.33%**
CQ^2L (1.33)	100	250	8.31	**55.4%**
CQ^2L (1.5)	100	250	9.37	**62.46%**

Elkhart SM-30 Automatic control Nozzle

Formula/co.	N.P.	Flow/GPM	Psi. FL/100.	Difference
$2Q^2+Q$	**100**	**300**	**21**	**Baseline=100%**
CQ^2L (2)	100	300	18	**85.71%**
CQ^2L (1.33)	100	300	11.97	**57%**
CQ^2L (1.5)	100	300	13.5	**64.28%**

Summary of friction loss differences

$2Q^2+Q$

The underwriter's formula $2Q^2+Q$ is the baseline of our comparison and represents 100 percent of what we believe the total friction loss in our hose is. When calculating friction loss in 1 ¾ inch hose, we use the Conversion Factor (*Cf*) of 5. Simply stated, 1 ¾ inch hose has approximately 5 times the friction loss of 2 ½ inch hose.

CQ^2xL

This is the most commonly used formula for calculating friction loss in fire US Fire Service today. The coefficients illustrated in the preceding tables and charts are listed in the following order.

1 ¾ inch hose

- 15.5 (IFSTA default coefficient)
- 11.65 (Coefficient as validated by the Engineer committee in May of 2007)
- 12 (Proposed coefficient as recommended by the Engineer committee and Apparatus Officer)

2 ½ inch hose

- 2 (IFSTA default coefficient)
- 1.33 (Coefficient as validated by the Engineer committee in May of 2007)
- 1.5 (Proposed coefficient as recommended by the Engineer committee and Apparatus Officer)