Wilmington Fire Department		
	Standard Operating Guideline	402
		Training
Pump Discharge Pressure		
Issue Date: June 15, 2024		Supersedes: September 2, 2019
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Review: October 7, 2025		

1.0 PURPOSE

1.1 The purpose of this guideline is to establish a uniformly accepted pump discharge pressure for apparatus certification, promotional testing and to ensure adequate fire flows as outlined in NFPA 1710. This is a general guideline only and will not cover all situations. Deviations from this guideline are allowed by the incident commander only with the express understanding that they shall bear the responsibility for any event resulting from said deviation.

2.0 SCOPE

2.1 This Standard Operating Guideline shall be adhered to by all personnel of the Wilmington Fire Department and shall be used during training evolutions and live fire incidents.

3.0 PROCEDURES

3.1 The Wilmington Fire Department shall use the standard equation PDP = NP + FL+ EL+ AL when calculating pump discharge pressures

PDP: Pump Discharge Pressure
NP: Nozzle Pressure
FL: Friction Loss
EL: Elevation Loss +/-
AL: Appliance Loss

3.2 Nozzle pressures shall be based upon manufacture specifications.

3.3 Friction Loss shall be calculated using the formula: $FL = C Q^2 L$

FL: Friction Loss in psi
C: Fire hose coefficient
Q: Flow rate in hundreds of Gallons per Minute (GPM)
L: Hose length in hundreds of feet

3.4 The coefficients of the hose "C" shall be the industry recognized values referenced in the Fire Protection Handbook, 17th edition or the Pumping and Aerial Apparatus Driver/Operator Handbook, 3rd edition.

3.5 The Wilmington Fire Department Field Pump Tables have been developed using these values in conjunction with manufacturer engine pressure guides in the case of automatic, constant pressure and specialty nozzles. These field pump tables shall be acceptable during all incidents.

3.6 At no time shall the PDP exceed the maximum safe working pressure of the hose which is less than the annual service test pressure

3.6.1 Large Diameter Hose (LDH) @ 200-psi service test pressure has a maximum operating pressure of 185-psi.

3.6.2 2 ½-inch hose @ 300-psi service test pressure has a maximum operating pressure of 275-psi.

3.7 Field EL can be calculated using (# floors -1) x 5 psi for above grade or .5 psi per foot.

3.8 Field AL shall be for any flow greater than 350 GPM

3.8.1 Master Streams 25 psi

1. Exception:

    a. No appliance loss for blitz nozzles

    b. Aerial master streams and specialty master streams i.e. (foam) shall follow manufacture recommendations.

3.8.2 All other Appliances 10 psi

4.0 RESPONSIBILTIES

4.1 This document shall be reviewed at least annually, or any time new equipment is placed into service which constitutes a needed change.

5.0 REFERENCED MATERIAL

5.1 Wilmington Fire Department Field Pump Tables
NFPA 1002: Standard for Fire Apparatus Driver/Operator Professional Qualifications, 2017 edition
NFPA 1710, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments, 2020 edition
National Fire Protection Association (NFPA) Fire Protection Handbook - 17th edition
International Fire Service Training Association (IFSTA) Fire Protection Publications – Pumping and Aerial Apparatus Driver/ Operator Handbook, 3rd edition.

> than 100% capacity of the apparatus

> than 70% capacity of the apparatus

> than 250 psi maximum at 50 % capacity

Metro 1, Smooth Bore (7/8 tip) or Vortex (7/8 tip)

Hose	Tip	Nozzle Pressure	Field FL per 100	Field GPM	100'	150'	200'	250'	300'
1 3/4	7/8	50	40	160	90	110	130	150	170

Akron Piercing Nozzle

Hose	Nozzle Pressure	Field FL per 100	GPM	100'	150'	200'	250'	300'
1 3/4	100	25	125	125	137.5	150	162.5	175

Smooth Bore 2 1/2" Nozzle

Tip	Nozzle Pressure	Field FL per	Field GPM	100'	150'	200'	250'	300'
1	50	10	200	60	65	70	75	80
1 1/8 of Fog @ 50/250	50	15	250	65	72.5	80	87.5	95
1 3/16	50	20	≅ 300	70	80	90	100	110
1 1/4	50	20	300	70	80	90	100	110

Metro 2 & Elkhart Chief 4000 - 24 (fixed or constant gallonage fog nozzle)

Hose	Nozzle Pressure	Field FL per 100	GPM	100'	150'	200'	250'	300'
2 1/2	50	15	250	65	72.5	80	87.5	95

2 1/2” Seattle load with 100’ 1 3/4” Condo kit @ 160 GPM & 90 psi FL

Hose	Nozzle Pressure	Field FL per 100	GPM	100'	200'	300'	400'	500'
2 1/2	50	5	160	95	100	105	110	115

Akron 3443 Mercury Quick Attack Monitor (Blitz)

Elevation 20 - 30 degrees manned, 30 - 60 degrees unmanned,
Maintain 10' of straight hose behind the nozzle. No loops. DO NOT operate the unit without the safety strap secured.
Table lists maximum pressures per manufacture.

Tip	Nozzle Pressure	Field FL per 100	GPM	100'	150'	200'	250'	300'
1 1/4	100	45	464	145	167.5	190	212.5	235
FOG (Fixed) 4447	100	50	500	150	175	200	225	250

TFT Blitzfire Monitor

Maintain 10' of straight hose behind the nozzle, No loops.
Varying methods of anchoring are allowed, however the safest method of restraining the monitor is the use of a tie down strap.
Table lists maximum pressures per manufacture.

Hose	Tip	Nozzle Pressure	Field FL per 100	GPM	100'	150'	200'	250'	300'
2 1/2	1 1/4	100	45	464	145	167.5	190	212.5	235
2 1/2	FOG (Red)	55	50	500	105	130	155	180	205

Smooth Bore Master Stream

Tip	Nozzle Pressure	Field FL per 100	Field GPM
1 1/4	80	10	400
1 3/8	80	15	500
1 1/2	80	20	600
1 3/4	80	30	800
2	80	50	1000

Appliance Loss > 350 GPMs

Master Stream 25 psi

Exception:

No appliance loss for blitz nozzles

Aerial master streams and specialty master streams i.e. (foam) shall follow manufacture recommendations.

All other Appliances 10 psi.

Sprinkler or Combination System

Connect to the FDC

Place the governor in PRESSURE mode.

Set the initial PDP to 150 psi (for 1 1/2" FDC use 100 psi)

Adjust the PDP +/- based on the radio report from the sprinkler room or the inline pressure gauge reading from the interior crew.

Standpipe

Connect to the FDC

Place the governor in PRESSURE mode.

Set the initial PDP based on PDP = NP + attack line FL +/- elevation loss + FL in the standpipe (25 psi) + FL in the supply line + EL (# floors - 1) x 5 psi) or .5 psi per foot (if PRDs are encountered and they cannot be overcome; pump to the top floor) Adjust the PDP +/- based upon the inline pressure gauge reading from the interior crew

Foam

Universal Gold AR-AFFF

1/2% Class A Wetting Agent

1% Simple Hydrocarbons

3% Polar Solvent i.e., Ethanol (gasoline/ethanol blends E-10 - E-85 & E-95)

6% Super Suppression

Reference: PRO/Pak portable multi-purpose foam system manual regarding foam setup and application

No tables have been created for booster nozzles (these nozzles are used for trash fires, wildland fires, and overhaul and do not produce sufficient flows for interior firefighting)