Lynbrook Fire Department

Hose Operations

Lynbrook Fire Department

Training Committee

Introduction

- Types and sizes of Fire Hose
- Basic Engine Operation
- Hose Evolutions
- Hose Handling
- Water Flow (Volume)
- Reach

Vocabulary

- Volume
- Pressure
- Single Jacket
- Double Jacket
- Operating Pressure
- Reach
- LDH
- Friction Loss
- Solid Bore Nozzle
- Fog Nozzle

Basics of Fire Hose

- NFPA 1961- Standard on Fire Hose
- Larger diameter hose can carry more water at lower pressures
- Smaller diameter hose carry less water and require higher pressure

Types and Sizes of Fire Hose

- Suction Hose
  - 5” or in some cases 6”
- Attack Hose
  - **1” Booster Line**
  - **1 3/4”**
  - **2 1/2”**
- Supply Hose
  - **3”**
  - **5”**

Engine Operations

- Move water through hose lines from a source of supply to the fire
  - Hydrant
  - Another Engine
  - Body of Water
    - Ocean
    - Lakes, Streams
    - Pools
- Increase pressure as necessary to provide proper nozzle pressure to fight the fire

Suction Hose- Hard Suction

- Hose that is designed to prevent collapse under vacuum conditions so that it can be used for drafting water from below the pump (lakes, rivers, wells, etc.).

Attack Hose

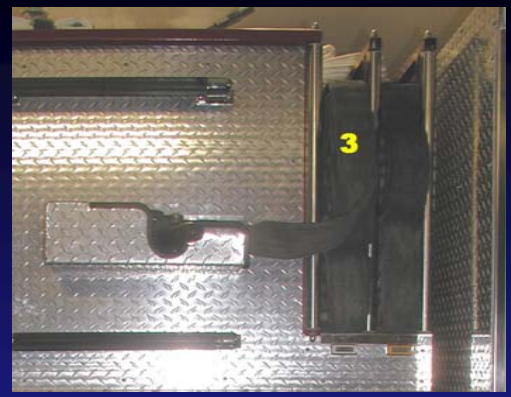
- Hose designed to be used by trained fire fighters and fire brigade members to combat fires beyond the incipient stage
- Attack hose shall have a minimum design operating test pressure of 275 psi
  - 1” Booster Line
  - 1 3/4” hose
  - 2 1/2” hose

Attack Hose- 1” Booster Line

- Rubber Hose
  - Used for Rubbish, Brush, Washdowns
  - Requires High Pressure (approx. 200 psi)
  - Delivers low volume (approx. 50 gpm)
  - Highly mobile- can be handled by 1 firefighter
  - Uses a fog type nozzle

Source: Portsmouth, Va. FD

Attack Hose- 1 3/4”



- Primary Attack Line for House Fires and Vehicle Fires
- Double Jacketed-
  - 275 psi max. operating pressure
- Can be operated by 2-3 firefighters
- Can deliver 140- 200 gpm
- Working pressure and volume varies with nozzle type
- Used with both solid bore and fog type nozzles

Attack Hose- 2 1/2”

- Primary attack line in Commercial Buildings
- Used to back up 1 3/4” lines
- Double Jacketed
  - 275 psi max. operating pressure
- Needs 3-4 or more firefighters to operate
- Delivers high volume of water (200- 300 gpm)
- Relatively difficult to operate, especially in tight spaces
- Usually used with a solid bore nozzle

Friction Loss

- “Rule of Thumb” Hydraulics
- 1 3/4” Hose- 15 lbs. friction loss per 50 ft.
- 2 1/2” Hose- 5 lbs. friction loss per 50 ft.
- Optimal Fog Nozzle pressure is 100 PSI
- Optimal Solid bore Nozzle pressure is 60 PSI

Flow Chart-

Automatic Fog Nozzle vs. Solid Bore Nozzle

	250 ft. 1 ¾”	250 ft. 2 ½”
Nozzle Pressure		
100 psi	140 gpm	200 gpm
60 psi	202 gpm	291 gpm

Source: Task Force Tips, Inc.

Supply Hose

- Used to supply an engine or tower ladder with water from a hydrant or another engine
- Sizes
  - 3”
  - 5”

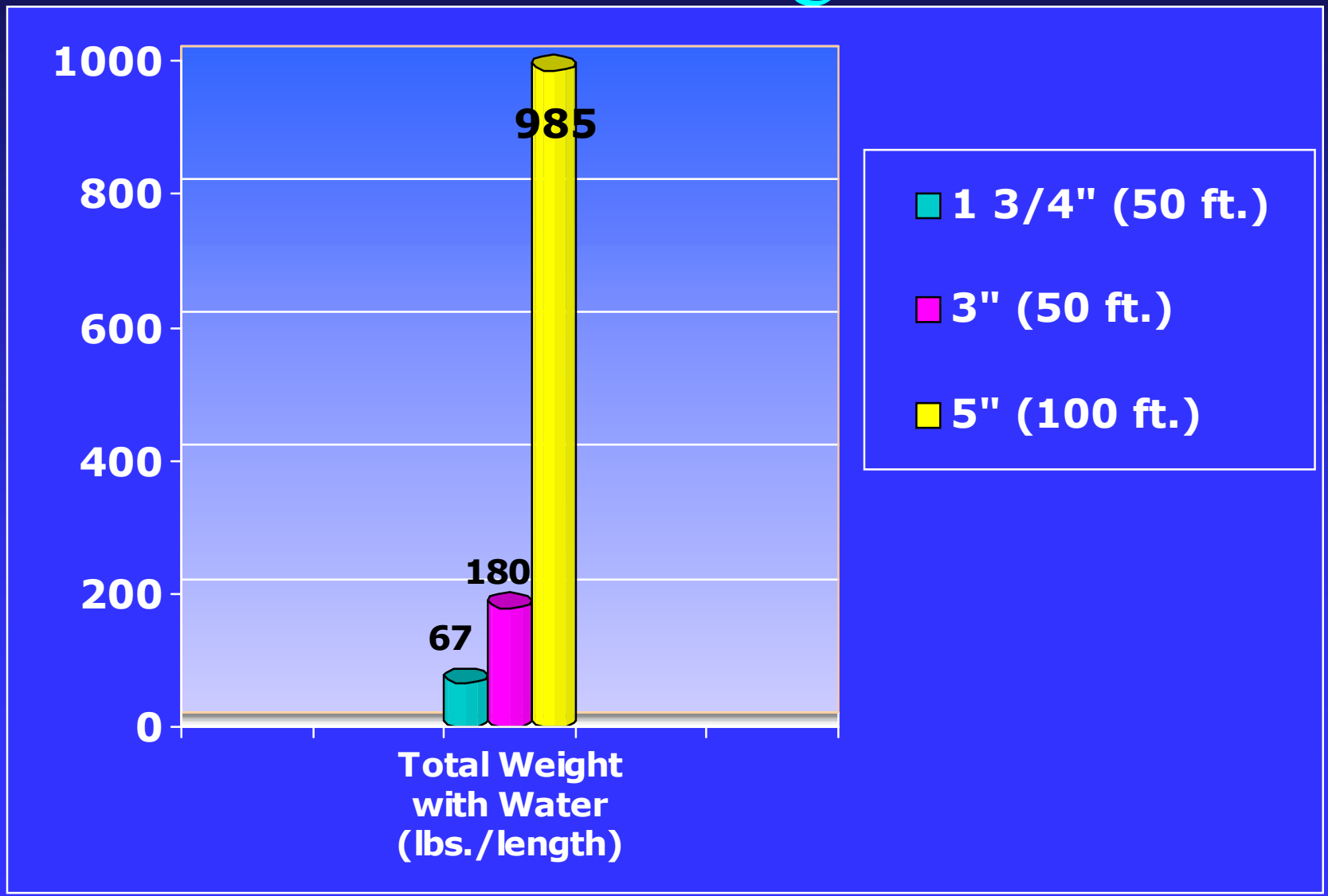
Supply Hose- 3”

- Double Jacketed-
  - 275 psi max. operating pressure
- Used to supply an Engine from the hydrant
- Used to supply an Engine from another Engine (in-line pumping)
- Can supply up to 600 gpm at 150 psi at a distance of 400 ft.
- Will require a “double lay” for longer distances or greater volumes

Supply Hose- 5”

- Single Jacketed
  - 185 psi max. operating pressure
- Used to supply an Engine from the hydrant
- May be used to supply an Engine from another Engine (in-line pumping)
- Can supply 1000 gpm at 60 psi (hydrant pressure) at distances up to 1000 ft.
- Diffcult to move when charged

Water Weight



Flow Comparison 3” & 5” Hose

Hose	Pressure	Volume	Distance	
3”	60 PSI	350 GPM	400 ft.	(Hydrant Pressure)
5”	60 PSI	1500 GPM	400 ft.	(Hydrant Pressure)

Source: Angus Fire - Hose Calc

Summary

- Hose diameter is the most important factor in determining volume of water delivered
- The optimum pressure changes with the diameter of the line - lower pressure is required in larger lines to move a given amount of water
- Attack lines are Booster Lines, 1 3/4”, 2 1/2”
- Supply Lines are 3” and 5”

Sources

- National Fire Protection Association
  - www.nfpa.org
- U.S. Fire Administration
  - www.usfa.fema.gov/
- Task Force Tips, Inc.
  - www.tft.com
- Angus Fire
  - www.angusfire.co.uk/