

FIRE HOSE BASICS

Objective:

Firefighter will possess a working knowledge of the NFPA recommended procedures for the care, maintenance and testing of cotton-jacket, lightweight and rubber booster hose. Firefighter will understand the basic types of hoses and their uses. Firefighter will also understand the basics of hose tactics and safety considerations.

I. Introduction

- A. The importance of reliable fire hose
 - 1. Essential for the protection of firefighters on the fireline
 - 2. Can mean the difference between controlling and losing the fire if a hose breaks
- B. Must ensure that all hose on the engine is in good condition
 - 1. The life of the hose is determined by how well it is cared for

II. Types of Fire Hose

- A. Linen or unlined cotton/synthetic
 - 1. Linen hose susceptible to mildew
 - 2. Very porous
 - a. Leaks until saturated then stays wet
 - 3. Used for specialized needs
 - a. Around coals, embers, or flame
 - b. In buildings for standpipe systems
- B. Cotton/synthetic Jacket rubber lined hose
 - 1. A circular woven jacket of cotton and synthetic fiber
 - a. Single Jacket
 - i. Lighter weight for wildland applications
 - b. Double Jacket
 - i. More durable for non-wildland applications
 - 2. Sizes from 1 inch to 5 inches
 - 3. Factory tested to 450 psi.
 - a. Maximum working pressure
- C. Booster Hose (Hard Line)
 - 1. Rubber lining with in several layers of fibers with a rubber covering
 - 2. Very heavy compared to other types of the same size hose
 - 3. Very durable and resistant to heat, chemical, and mechanical damage
 - 4. High friction loss in the standard 3/4 inch size

5. High working pressure of 600 psi.
- D. Synthetic Jacket Hose (light weight, Hotline)
1. Light weight synthetic jacket
 2. Liner is a thin plastic fused to the jacket
 3. Very light weight
 4. More susceptible to heat and abrasion than cotton jacket hose
 5. Some jackets are slippery and may not hold in packs well
 6. Double jacket is available
 7. Factory tested to 450 psi
 - a. maximum working pressure
- E. Hard Suction
1. Used for drafting
 2. Should with stand 25" hg (vacuum)
 3. Wire spiral with reinforced rubber or transparent plastic
 4. Available in various lengths and sizes from 1 inch to 6 inches
 5. Not designed for pressurized use

III. Causes of Fire Hose Damage

- A. Mechanical Damage
1. Indicated by worn spots, rips, abrasions and crushed or damaged couplings or cracked expansion rings
 2. Processes of common damage
 - a. Dragging hose over sharp or rough objects
 - b. Vehicles driving over unprotected hose line
 - c. Water hammer
 - d. Excessive engine pressure
 - e. Couplings crushed by vehicles
 - f. Not repacking hose at a minimum of once a month or repacking hose with the bends in the same locations
- B. Heat Damage
1. Hot material or flame contacting the jacket
 2. Heat damage from drying on hot pavement
- C. Mildew Damage
1. Hose remains wet for a long period resulting in the growth of mold and mildew that break down cotton fibers
 2. Common when wet hose is stored for the winter

- D. Chemical damage
 - 1. To a varying degree all hose is susceptible
 - 2. Most common chemicals effecting hose on the job
 - a. Gas and diesel
 - b. Oil
 - c. Foam concentrate
 - 3. Solar damage
 - a. Ultra violet light will break down fibers with prolonged exposure
 - b. Do not dry or store hose in direct sunlight

IV. Care of Fire Hose

- A. On the fire line
 - 1. Avoid laying hose over sharp objects or corners
 - 2. Use hose bridges to protect from damage by vehicles
 - 3. Avoid water hammer, may burst hose
 - 4. Avoid dropping or dragging couplings
 - 5. Avoid using excessive engine pressures
 - 6. Keep hose out of hot areas or areas that may soon burn
 - 7. Keep hose well away from dozers
- B. At the station
 - 1. Replace wet or dirty hose as soon as practical
 - 2. Clean hose with water and as little soap as possible
 - 3. Dry hose before rolling and storing
 - 4. Repack hose packs and hose lays within 30 days
 - a. Relocate bends in hose to when repacking packs or lays
 - 5. Clean hose contaminated with chemicals immediately
 - 6. Thoroughly rinse hose after washing
- C. Drying hose
 - 1. Use a hose rack or drying tower - do not dry on hot pavement
 - 2. Do not dry hose in direct sunlight to avoid solar damage
- D. Storage
 - 1. Hose jacket should be completely dry before storage
 - 2. Store with rubber lining slightly damp
 - 3. Stored hose has been inspected, tested, washed, dried, and rolled
 - 4. Store hose in well-ventilated area out of direct sunlight

V. Testing Hose

A. Test hose regularly

1. At least annually
2. After use
3. After recoupling
4. After freezing

B. Test procedures

1. Lay out hose with no more than 300 ft. of hose in any one line to be tested
 - a. Multiple lines may be tested but each should not be over 300 ft. in length
 - b. Remove any kinks
2. Mark the hose at the coupling
 - a. Use a pencil line
 - b. Allows the tester to see if couplings have slipped while testing
3. Fill hose with water
 - a. Expel all air from hose
4. Close Nozzle
 - a. Check for leaks at nozzle or couplings
 - b. Replace gaskets if necessary
5. Slowly raise pressure to test pressure
 - a. 300 psi. for most initial attack hose
 - b. Hold test pressure for 3 minutes
 - c. Keep all personnel away from hose being tested
 - d. Recoupled hose should be retested at a test pressure of at least 50% greater than the service test pressure. ie. 450psi.
6. Check all lines visually
 - a. Walk only down left side of hose when checking
 - i. Left side is determined by standing at test device looking toward nozzles
 - b. Stay at least 15 feet away from hose
7. Reduce pressure and drain lines
 - a. Check couplings at this time for slippage
 - b. Slippage occurs most often on recoupled hose
8. Refer to Water Handling Equipment Guide or NFPA 1962, Care use and Maintenance of Fire Hose for further instructions.

VI. Hose Couplings

A. Care and maintenance of couplings

1. Avoid dragging or dropping
2. Keep vehicles from driving over couplings
3. Clean threads of all dirt and debris
4. Lubricate swivel as needed with graphite
5. Inspect and replace gaskets as needed
 - a. Remove gasket and bend double to look for cracks
 - b. Inspect couplings as hose is being stored

B. Threads

1. Numerous thread types across the country
2. National Hose Thread
 - a. NH or NHT
 - b. Standard for USFS 1 1/2 or larger hose
3. National Pipe Straight Hose
 - a. NPSH
 - b. Standard for USFS 1 inch hose

4. Threads of common hose types

<u>Size</u>	<u>Threads per inch</u>	<u>Thread type</u>
3/4"	11.5	NH or Garden Hose (GH)
1"	11.5	NPSH
1"	8	NH or Chemical
1 1/2"	11.5	NPSH
1 1/2"	9	NH
2 1/2"	7.5	NH
4"	4	NH

5. Higbee & Higbee Cut

- a. Higbee is the short flat triangular fade at the tip of a male thread
- b. Allows attaching a fire hose coupling quickly to another coupling
- c. Higbee Cut is a notch on one of the male and female coupling rocker lugs
- d. Line these notches up to make joining two lengths of hose quick and easy

6. Gaskets

- a. Rubber gasket is required for couplings with straight thread
- b. Check gaskets by bending in half and checking for cracks

VII. Wildland Hoselays

- A. Extending hose from the engine to the fire, exposure, or water source which allows delivery of water safely and effectively with sound hydraulics and procedures
- B. Simple Hoselays
 1. Hose is advanced by adding lines behind the nozzle and lateral lines are not preconnected.
 - a. Live reel or booster line
 - i. Commonly $\frac{3}{4}$ " or 1" hose on a 100 to 250 ft. reel
 - ii. A readily available charged line generally considered to be the quickest attack
 - iii. Flow can be limited depending on hose size
 - iv. Often used for mobile attack
 - v. Do not count on a reel line to be the attack line or back-up in critical situations if nozzle flow will not achieve required volume
 - b. Preconnected attack line
 - i. $1\frac{1}{2}$ " line for high volume
 - ii. Provides maximum flow for quick knock down and protection
 - iii. All the hose must be pulled out before charging
 - c. Hose packs
 - i. 2 - 100 ft. sections of $1\frac{1}{2}$ " hose
 - ii. Uses a $1\frac{1}{2}$ " nozzle along with hose clamp to progress hoselay
 - Advantages: High pressure and volume are available for long reach and knock down potential. Minimal hose is advanced up the line.
 - Disadvantages: If laterals are not installed rekindles can be problematic. If not installed laterals must be added for mop-up. The $1\frac{1}{2}$ " nozzle has the potential to waste water if not carefully used. Unless shutoffs are used hose must be clamped to add the next line.
- C. Progressive Hoselays
 1. Hose is systemically added to the previous hose extending the hose line while a wet line is constructed along the fire's edge and lateral lines are preconnected
 - a. Hose packs
 - i. 1 - 100 ft. section of $1\frac{1}{2}$ " hose & 1 - 100 ft. section of 1" hose
 - ii. Uses a $1\frac{1}{2}$ " gated wye with reducer and 1" nozzle
 - Advantages: Laterals are available every 100 ft. if needed. Trunk line can easily be shut off if needed without clamps. Low water use with 1 in. nozzle.
 - Disadvantages: The 1" nozzle may not be adequate for certain conditions. Each pack only extends line 100 ft. One lateral every 100 ft. may be excessive. Wyes may be shut off accidentally.

VIII. Wildland Hoselay Tactics

- A. Start from an anchor point
- B. Maintain control of the crew, as with any tactic don't start until the attack plan has been explained to the crew
- C. Hose evolutions work best when they have been practiced, each person has a specific task, and predetermined communications are laid out.
- D. Do not progress ahead of the lead nozzle
- E. Patrol for spots and flare-ups which could threaten the hose or personnel
- F. Back up the wet line as soon as possible with line construction
- G. Pass hose under wire fences and over wooden fences
- H. Lay hose on the green side of the line or away from the hot edge
- I. Leave about 10% slack in the line to allow for replacement with a shorter hose and easier movement of the hose away from hazards
- J. Use only as much water as needed to stop the progress of the fire but not so little as to risk losing the hoselay from a rekindle
- K. Keep hose out of dozer lines.

IX. Mobile Attack Tactics

- A. One or two simple hoselays with a moving engine
- B. Must be able to drive on the burned terrain
- C. Possible with as few as two personnel
- D. Engine must be able to pump and roll
- E. Most effective in light fuels
 - 1. Can extinguish large lengths of fire edge with a relatively small amount of water
 - 2. Rekindles often occur
 - a. Use a smooth bore tip to penetrate matted grass
 - b. Use a back-up line or backpack pump to extinguish flare-ups
 - 3. Smoke may impair visibility
 - a. Stop engine when nozzle person hits windshield with water
 - 4. Work from inside the black and from an anchor point
 - 5. Do not run over the hose
 - a. Use an extra person to pull hose for the nozzle person