THE EVOLUTION OF FIRE HOSE

Fire hose, as we think of it today, has been in use since the late 1800s. While fire hose existed prior to this, it came in vastly different forms and was mostly made from leather materials. When fabric reinforced hose was introduced in 1898, it quickly made its way through the market, which necessitated the first NFPA hose standard. The market remained steady in its acceptance of heavy rubber-lined, cotton-jacketed hose for almost 75 years before newer technology started to emerge.

The availability of synthetic materials, such as polyester or nylon yarn and thermoplastic for liners, started a new wave of products in the 1970s. The advantages of the new synthetic yarn materials over the natural fiber cotton and linen soon became well known in the market, including higher strength to weight, easier to weave, quicker to dry and resistance to rot. Higher service pressures, less weight and easier maintenance became the mantra of synthetic fire hose as it pushed into the market, and as a result, cotton-jacketed hose is now unheard of in the fire service. Linen hose, which had no lining, has also not been made since the mid-1980s. Today, manufacturers offer, or produce as standard, hose that is coated with polymers to aid abrasion resistance and cut the water pick up in the jackets. Fire hose is also now available in different colors giving customers choices that were previously unavailable.

The modern materials now used have led to hose products that are lighter in weight while maintaining high-pressure capabilities. They are easier to pack, carry up flights of stairs, advance when charged, reclaim and repack when done. The workload is much less now than 45 years ago. Thermoplastic lining has helped reduce the weight greatly, as it can be manufactured thinner with the same or greater strength than the old standard rubber compounds. More recently new rubber compounds, such as EPDM, have been developed that can be used to produce thinner linings and also reduce weight.

COUPLINGS

Couplings are also part of the hose. While brass couplings are still popular for interior occupant use hose (rack hose), they have almost entirely been replaced by aluminum couplings for attack or supply hose when not in contact with sea water. This can save multiple pounds on a length of hose. All these changes can easily add up to a 30 percent savings in weight or 30 pounds on a two-and-a-half inch carry hose pack of the old design. Since heart attacks are the most common cause, by far, of firefighter injury or death, having lighter equipment to carry is important.

WILDLAND FOREST FIRE HOSE

These same benefits have been greatly received in the wildland forest fire hose. For forest fires, miles of hose are often laid for firefighting. Weight reduction means less work and less energy spent on transport. Synthetic hose can also be dried in a few hours, instead of the 10 hours needed after cleaning cotton hose; that can reduce turnaround time for deployment, requiring less inventory. The worry about rot during transport is also greatly alleviated; once used and wet, cotton hose used to be transported in refrigerated trucks to prevent mildew. All these benefits have been developed while service pressures have also risen.

OCCUPANT-USE/RACK HOSE

Occupant-use hose, or rack hose, while seeing declines in use in North America, is still widely used in the rest of the world. It serves where fire department response times are questionable,

sprinklers are not available, or where fire equipment may have difficulty reaching. Typically, the hose is stored on racks in approved metal fire cabinets, which are placed in locations appropriate for the size and layout of the building. This hose provides longer term protection should egress of the building be cutoff by fire or damage. Sprinkler system failures may also occur, normally due to human interaction with the systems.

Occupant-use hose provides redundancy in the safety system when primary plans fail. When used for smaller fires to keep temperatures down, these hoses can prevent major water damage caused when the whole sprinkler system is triggered and their shutoff is delayed after the need for water has subsided. Modern hose is much better suited for this application than the old linen hose since yarn fiber degradation due to rot is eliminated, giving it a long reliable service life, even in hot, high humidity environments. Strong modern synthetic yarn also provides easily attainable higher service pressures, so minor damage will not compromise the service pressure.

STANDARDS

General fire hose standards in North America and many parts of the world are provided by National Fire Protection Association (NFPA), UL and Factory Mutual Global (FM). While NFPA writes standards, such as NFPA 1961 for fire hose, it does not test or certify hose. UL (Standard UL19 and UL219) and FM (Standard 2111) both write standards, certify test products, and maintain a listing of certified manufacturers and their products. Every effort was made between these three agencies to produce standards that are in harmony with each other. Many building and fire codes require hose and hose cabinets to be a listed product by UL or FM. While the products are tested and certified to the standards, to be listed by UL or FM, the manufacturer is required to have a demonstrated quality system in place. This system is frequently audited, along with the product manufacturing. Control samples of the products are kept on file for various follow up tests.

Recent changes to NFPA 1961 2020 edition require new testing requirements for attack hose. Friction loss testing was added and new radiant and conductive heat tests were developed for this edition. The radiant and conductive heat tests were designed to show when a failure can occur and what type of failure it is, such as leakage or catastrophic failure. The NFPA Technical Committee on Fire Hose decided to specify that these test results have to be made available to anyone interested in purchasing the products. These tests were adopted and included into UL Standard UL19, which has become the lead agency testing hose. All UL listed products must have these newly required tests performed in order to maintain their listing. Additionally, starting with the 2013 edition, NFPA 1962 requires that hose manufactured prior to July 1987 be removed from service, adding a level of safety for users of fire hose and allowing for the introduction of new technology and materials.

The NFPA committee and interested participants had hoped that the standard changes and new standard test criteria would drive new innovation to improve fire hose products by exploring newer materials and manufacturing techniques. Many of the high-performance materials used in firefighter gear are not suitable for the rough and ready environment of fire hose, but newer materials and better manufacturing processes are on the horizon. The steady evolution of fire hose will surely continue for years to come.

About the Fire Equipment Manufacturers' Association
The Fire Equipment Manufacturers' Association is a more than 60-year-old non-profit trade association dedicated to saving lives and protecting property by providing education of a balanced fire protection design. For additional information, including videos, interactive questionnaires and training websites about fire safety and protection, visit **femalifesafety.org** or call 216-241-7333. For a complete listing of member companies, visit the Members page of the association's website at **femalifesafety.org/members**.

Fire Hose, Cabinet & Valve Division Member Companies Include:

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