Objectives

- Describe the three primary types of fire service rope.
- List the two types of life safety rope.
- Describe the characteristics of a general use life safety rope, technical use life safety rope, escape rope, and utility ropes.
Introduction

• Ropes are widely used in the fire service.
• May be your only means for rescue
• A fire fighter must be able to tie simple knots accurately and without hesitation.
Types of Rope

- Life safety
  - Used solely for supporting people
- Escape
  - Used for emergency self-rescue
- Utility
  - Used in most cases when it is not necessary to support a person
Life Safety Rope

- Never used as utility rope
- Must be used when supporting the weight of one or more persons
Types of Life Safety Rope

- Technical use life safety rope
- General use life safety rope
Escape Rope

- Used for self-rescue in extreme situations
- Designed for the weight of one person
- Should be replaced after one use
- Use the rope only as a last resort.
Utility Rope

- Is not used to support a person
- Used for hoisting, lowering, and securing equipment
- Requires regular inspection
Rope Materials

- Ropes can be made of many types of materials.
- Earliest ropes were made from natural vines woven together.
- Now ropes are made of synthetic material.
Natural Fibers

- Natural fiber ropes were often made of manila.
- Currently used for utility, not life safety, tasks

**Drawbacks to Using Natural Fiber Ropes**

- Rot, abrasion, age low strength-to-weight ratio, low shock load absorption capability
Synthetic Fibers

- Advantages to Using Synthetic Fiber Ropes

Strong, resistant to rotting and mildew, absorb much less water, do not age or degrade as quickly as natural fibers.
Synthetic Fibers

- Life safety rope is always synthetic.
  - Nylon
  - Polyester
  - Polypropylene
Rope Construction

- There are several types of rope construction. The best choice depends on the specific application.
  - Twisted Rope Construction- twisted into strands.
  - Braided Rope Construction-Strands woven like hair braiding

- Kernmantle Rope Construction-Kern is the center core. Mantle is the sheath-like braided covering that protects kern from dirt and abrasion.
Dynamic and Static Rope Construction

- **Dynamic**
  - Designed to be elastic
  - Usually used by mountain climbers

- **Static**
  - Has a limited range of elasticity
  - More suitable for rescue situations
Rope Maintenance

- All ropes require proper care.
- Four parts to maintenance:
  - Care
  - Clean
  - Inspect
  - Store
Inspect the Rope

- Inspect life safety rope after each use and on a regular schedule when unused.
- Look for cuts and damage as you run it through your fingers.
Store the Rope

- Avoid temperature extremes and keep out of sunlight and away from fumes of gasoline, oils, and hydraulic fluids.
- Use a separate apparatus compartment.
Knots

- Ways of fastening ropes and webbing to objects or each other.
- Fire fighters must know how and when to use knots.
  - Knots are used for multiple purposes.
  - Knots reduce rope load-carrying capability.
Knot Terms

- Working end
  - Used in forming knots
- Running end
  - Used in lifting or hoisting
- Standing part
  - Between the working and the running end
Knot Terms

- **Bight**
  - Reverse direction to form *U*-bend
- **Loop**
  - Makes a circle in the rope
- **Round turn**
  - Makes a loop with parallel ends
Basic Fire Service Knots

- Safety knot (overhand knot)
- Half hitch
- Clove hitch
- Figure eight
- Figure eight on a bight
- Figure eight follow-through
- Figure eight bend
- Bowline
- Bend (sheet or Becket bend)
Safety Knot

- Secures the leftover working end of the rope to the standing part of the rope.
- Ensures primary knot will not become undone.
- To test, try sliding it on the standing part of the rope.
  - A knot that is tied correctly will slide.
Methods of Knot Tying

- Find a method and use it all the time.
- Your department may require a specific method.
- You should be able to tie knots while wearing gloves, in the dark, and behind your back.
Hoisting

- In an emergency, you may have to raise or lower tools and equipment.
  - Important that the object is properly secured.
  - Coworkers must be able to quickly remove the object.
- When hoisting or lowering, be sure no one is under the object.
Hoisting

- Always use utility rope for hoisting tools and equipment.
- If a life safety rope gets oily or greasy, it should be taken out of service and destroyed.
Summary

- Three primary types of fire service rope:
  - Life safety
  - Escape
  - Utility

- Life safety ropes are rated as technical use life safety rope and general use life safety rope.

- An escape rope is designed to be used once by one fire fighter.
Summary

- Ropes can be made of natural or synthetic fiber.
- Three common rope construction types:
  - Twisted rope
  - Braided rope
  - Kernmantle rope
Summary

- Rope rescues involve people trapped in inaccessible locations.
- All ropes need proper care to perform in an optimal manner.
Summary

- Knots are prescribed ways of fastening lengths of rope or webbing to objects or to each other.
- It is important to learn the terms used to refer to parts of a rope.
- A fire fighter should know the basic ways to tie a knot.