**Chapter 13: Ladders**

**Chief Concepts**

* The primary function of ladders is to provide safe access to and egress from otherwise inaccessible areas.
* Ladders can be used for several secondary functions, including channelling debris, serving as a lift point, and holding other firefighting equipment.
* The two main structural components of the ladder are the beam and the rung. The beams support the rungs and carry the load of the fire fighter from the rungs down to the ground.
* There are three basic types of ladder beam construction: trussed beam, I-beam, and solid beam. Trussed beams are usually constructed of aluminum or wood. I-beam ladders are usually made from fibreglass.
* Many wooden ladders have solid beams. Rectangular aluminum beams, which are usually hollow or C-shaped, are also classified as solid beam ladders.
* The rung is a crosspiece that spans the two beams of the ladder. Most portable ladders in fire departments have aluminum rungs, but wooden rungs are also in use.
* Additional parts of a typical portable ladder include the following components:
	+ Rail—The top or bottom section of a trussed beam or the top and bottom surfaces of an I-beam
	+ Truss block—A piece or assembly that connects the two rails of a trussed beam
	+ Tie rod—A metal bar that connects one beam to the other
	+ Tip—The very top of the ladder
	+ Butt—The end of the ladder
	+ Butt spurs—Metal spikes designed to help stabilize the ladder in place
	+ Butt plate—An alternative to butt spurs; a swiveling plate that incorporates both a spur and a cleat
	+ Protection plates—Reinforcing plates placed at chafing or contact points
* An extension ladder is an assembly of two or more ladder sections that fit together and can be extended or retracted to adjust the length of the ladder. Additional parts of an extension ladder include the following components:
	+ Bed section—The base of the extension ladder
	+ Fly section—The section of the ladder that is raised from the bed section
	+ Guides—Strips of metal or wood or channels that guide the fly section during extension
	+ Halyard—The rope or cable used to extend the fly sections
	+ Pawls—Mechanical locking devices that secure the fly sections
	+ Pulley—A small wheel used to change the direction of the halyard pull
	+ Stops—Pieces of wood or metal that prevent the fly sections from becoming overextended
	+ Staypoles—Long metal poles used to stabilize the extension ladder
* There are two general categories of ladders: aerial and portable. Aerial ladders are permanently mounted and operated from a fire apparatus. Portable ladders are carried on fire apparatus and removed from the apparatus to be used in other locations.
* Portable ladders include general-purpose ladders such as straight or extension ladders and specialized ladders such as attic or roof ladders.
* Fire apparatus are required to carry at least one roof ladder, one extension ladder, and one folding ladder.
* A straight ladder is a single-section, fixed-length ladder.
* A roof ladder is a straight ladder with retractable hooks at one end.
* An extension ladder is an adjustable-length ladder with multiple sections.
* Bangor ladders are extension ladders with staypoles for added stability.
* A combination ladder can be converted from a straight ladder to a stepladder configuration, or from an extension ladder to a stepladder configuration.
* A folding ladder is a narrow, collapsible ladder designed to allow access to attic scuttle areas and confined areas.
* A Fresno ladder is a narrow, two-section extension ladder designed to provide attic access.
* Portable ladders must be regularly inspected, maintained, and service tested following NFPA 1932.
* A ladder should be inspected visually after every use. If the inspection reveals any deficiencies, the ladder must be removed from service until repairs are made.
* All fire fighters should be able to perform routine ladder maintenance, including cleaning the ladders to remove any road grime and dirt. Ladders should be cleaned after every use.
* Service testing of portable ladders must follow NFPA 1932.
* Safety precautions should be followed from the time a ladder is removed from the apparatus until it is returned to the apparatus. Full turnout gear and PPE are essential for working with portable and aerial ladders. Additional general safety rules include the following:
	+ Lift with your legs, keeping your back straight.
	+ Look overhead for wires and obstructions before raising or lowering a ladder.
	+ After extending an extension ladder, check the pawls (ladder locks) to confirm that they are set and make sure the halyard is tied off.
	+ Check the ladder for the proper 75-degree angle. Ensure that the wall or roof will support the ladder before climbing it.
* When positioning a ladder for rescue, place the tip of the ladder at or slightly below the windowsill. This provides a direct pathway to enter and exit the window.
* Communication is key to coordinating efforts when working with ladders. One leader should be designated, and his or her commands should be followed during carries and raises.